WAVETEK
SAN DIEGO

9045 BALBOA AVENUE, SAN DIEGO, CALIFORNIA

INSTRUCTION MANUAL

MODEL 152
VARIPHASE GENERATOR

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SAFETY

This instrument is wired for earth grounding via the facility power wiring. Do not bypass earth grounding with two wire extension cords, plug adapters, etc.

BEFORE PLUGGING IN the instrument, comply with installation instructions.

MAINTENANCE may require power on with the instrument covers removed. This should be done only by qualified personnel aware of the electrical hazards.

WARNING notes call attention to possible injury or death hazards in subsequent operation.

CAUTION notes call attention to possible equipment damage in subsequent operations.

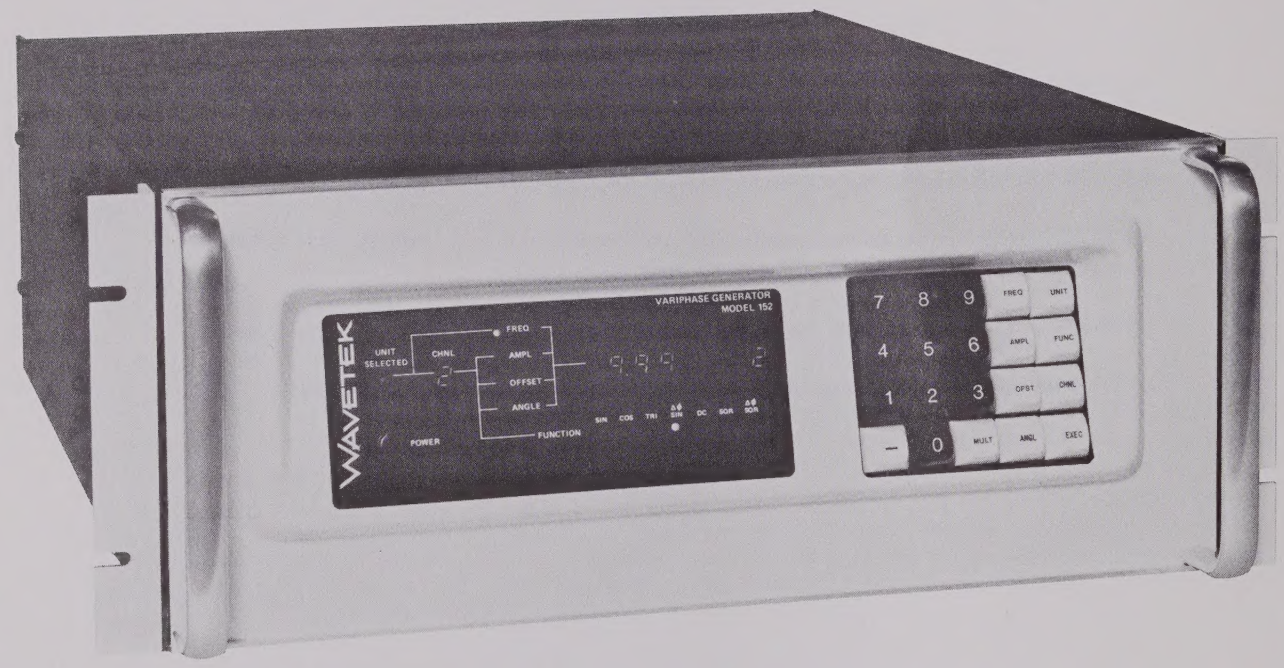


Figure i. Model 152 Variphase Generator

SECTION 1
INTRODUCTION

1.1 MODEL 152

The Model 152 Programmable Variphase Generator is a two channel precision source of selectable waveforms with variable phase relationship. Frequency programmed applies to all channels. Amplitude, offset, phase and waveform for each channel can be independently programmed. The phase relationship of the phase variable sine and phase variable square wave is referenced to a sync output and is variable with 0.1° resolution.

The generator is digitally controlled locally with front panel keyboard pushbuttons, and remotely with a selection of 21 ASCII (7-level) "typing" characters (with appropriate external interface). The effect of each control is digitally displayed on the front panel with red LED (light emitting diode) indicators. Numeric readout of frequency, offset and amplitude is in 3-digit scientific notation. Phase angle is displayed in 4 digits.

Sine, cosine, triangle, square, variphase sine and variphase square waveforms of frequencies from 1 Hz to 100 kHz plus dc and amplitudes from 10 mV peak to 9.99V peak can be generated.

Waveform center reference levels can be offset positive or negative from 10 mV to 9.99V and selected waveform phase, or polarity, can be inverted (180 degrees).

Along with the two low impedance ($< 1\ k\Omega$) rear panel channel (CH) outputs, which are the controlled waveform signal outputs, the generator delivers a square wave of the selected frequency for a synchronizing pulse output (SYNC OUT).

Analog inputs are received at the rear panel for external synchronization operation (SYNC IN).

Remote programming is accepted at a rear panel connector (EXT PROGRAM).

All programming (except phase angle) for one channel is stored in buffer registers while another channel is being programmed. When the programming is completed, an EXECUTE command will transfer data from all the buffer registers to working registers, thus activating the digital to analog converters. In the case of phase angle programming, the phase angle program is accepted only for the last channel accessed.

Up to nine generators can be connected in parallel with one another as a multiple unit group. Each generator is internally configured with its own address, or unit select code, from 1 to 9. For example, an installation may have one master display and keyboard panel, which is used to address and command the slave generators. The status of the addressed generator would be displayed.

1.2 INTERFACE

The generator accepts TTL ground true 7-bit ASCII "typing" characters serially; the 7 bits of each character are accepted in parallel. A clock line in parallel with the data bits is used to clock in the data characters. Computer control is accepted as is keyboard control from another generator in multiple unit groups. With computer control, the generator keyboard control panel can be locked out, or disabled, to prevent control competition.

1.3 OPTIONS

Several interface options are available. They include input isolation and the General Purpose Interface Bus (GPIB).

1.4 ACCESSORIES

Accessories for the generators include interfaces for several minicomputers.

1.5 PHYSICAL DESCRIPTION

The mechanical characteristics of the Model 152 are given in paragraph 1.6.5. The standard model comes equipped with a 10 foot, 3 wire detachable power cord and rack mount adapters. Interface cabling requires Molex brand connectors (see paragraph 2.2.3); one is furnished.

1.6 SPECIFICATIONS

Specifications apply for control settings from 1.00 to 9.99.

1.6.1 Versatility

Waveforms
Sine ∿ , cosine ∧ , triangle △ , square ⊓ , variphase sine, variphase square and dc selectable. All waveforms except triangle and variphase sine may be inverted by changing the polarity of the peak amplitude programming.

Frequency Range
1 Hz to 100 kHz in 5 ranges with 3 digit resolution.

10^0	1 Hz to 9.99 Hz
10^1	10 Hz to 99.9 Hz
10^2	100 Hz to 999 Hz
10^3	1 kHz to 9.99 kHz
10^4	10 kHz to 99.9 kHz

Main Output
DC voltage, ±10 mV dc to ±9.99 Vdc at 100 mA maximum. Output impedance less than 1Ω. Sine, cosine, triangle, square, variphase sine and variphase square, 10 mV peak to 9.99V peak at 100 mA peak maximum output current in 3 ranges (10^0, 10^{-1}, 10^{-2}). The output impedance is less than 1Ω and may be loaded by less than 1000 pF distributed capacitance in the form of connecting cables.

Variable Phase
One channel of variphase (sine or square) may be varied with respect to another variphase channel from 0° to 360° with 0.1° resolution. Phase angle may be varied with respect to sync in or sync out but accuracy is not defined.

DC Offset
All waveforms may be offset 9.99V above or below ground level with 3 digit resolution and selectable polarity. Signal level plus offset voltage must not exceed ±9.99V peak.

Sync Output
A TTL compatible 0.4 to 2.5V square wave output, which sinks 16 mA load current for up to 10 TTL loads. The positive rising edge of the square wave is in phase with zero degree phase of the sine wave.

Sync Input
Generator may be synchronized to an external time and amplitude symmetrical waveform of at least 1V peak and within 1% of the programmed frequency.

1.6.2 Accuracy

Horizontal Precision (Frequency Accuracy)
±(1% of program +0.1% of range) for 1 Hz to 10 kHz.
±(2% of program +0.1% of range) for 10 kHz to 100 kHz.

Vertical Precision (Amplitude Accuracy)
Square and Variphase Square Waveforms:
±(1% of program +0.1% of range) for 1 Hz to 10 kHz
±(3% of program +0.1% of range) for 10 kHz to 100 kHz
Sine, Cosine and Variphase Waveforms:
±(3% of program +0.1% of range) for 1 Hz to 10 kHz
±(6% of program +0.1% of range) for 10 kHz to 100 kHz
Triangle Waveform:
±(2% of program +0.1% of range for 1 Hz to 10 kHz

NOTE

Vertical precision stated is for 10^0 amplitude multiplier. For 10^{-1} and 10^{-2}, add 2% per decade attenuation ±5 mV dc offset.

DC Offset
±(1% of program +0.1% of range).

Sine Wave Frequency Response
Amplitude change with frequency less than:
±0.3 dB to 10 kHz
±0.8 dB to 100 kHz

Phase Angle
Variphase Sine:
±0.3° to 1 kHz
±1° to 10 kHz
±4° to 100 kHz
Variphase Square:
±0.5° to 1 kHz
±1.5° to 10 kHz
±5° to 100 kHz

Frequency Stability
Short Term: ±0.05% for 10 minutes.
Long Term: ±0.25% for 24 hours.

1.6.3 Waveform Purity

Sine Wave Distortion (Total Harmonic Distortion)
Sine and Cosine Waveforms:
Less than 0.2% to 10 kHz
Less than 0.7% to 100 kHz
Variphase Sine Waveform:
Less than 0.25% to 10 kHz
Less than 0.8% to 100 kHz

Triangle Linearity
Greater than 99% to 10 kHz.

Square Wave Rise and Fall Time
Less than 3 μs for 20V p-p (6.7 V/μs).

Total Aberrations
Less than 5% of program value ±10 mV.

1.6.4 Environmental

Specifications apply for 25°C ±5°C. For operation from 0°C to +50°C, derate all specifications by a factor of 2. Unit may be stored from −40°C to +75°C without damage.

1.6.5 Mechanical

May be used on the bench or in a 19 inch rack. Rack adapter hardware and program mating connectors included.

Dimensions
17¼ in./43.8 cm wide, 7 in./17.8 cm high, 23½ in./59.7 cm deep.

Weight
43 lb/19.5 kg net, 52 lb/23.6 kg shipping.

Power
90 to 110V, 105 to 125V, 180 to 220V or 210 to 250V; 50 Hz to 400 Hz. Less than 150 watts.

Programming Transition Time
Unit accepts bytes at a 1 MHz rate. The output will become stable within 100 μs unless frequency, frequency range or phase angle is changed. For frequency and frequency range the output will be stable within 1 ms. For phase angle the output will be stable within 10 ms after receiving the next program prefix (e.g. A for amplitude).

Isolation
Signal ground and program ground are common in the standard 152. Optical isolation is available.

Logic Level Requirements

State	Requirements
Low (Logic "1")	0V to 0.4V sinking 25 mA maximum
High (Logic "0")	2.4V or open

NOTE

1. *Open input is 3.0V.*
2. *Input is terminated by 220Ω to +5V and 330Ω to ground.*
3. *Recommended driver: SN 7438.*

SECTION 2
INSTALLATION AND OPERATION

2.1 MECHANICAL INSTALLATION

After unpacking the instrument, visually inspect all external parts for possible damage to connectors, surface areas, etc. If damage is discovered, file a claim with the carrier who transported the unit. The shipping container and packing material should be saved in case reshipment is required.

The standard generator is a bench-top instrument with a collapsible tilt-bail to elevate its front end for convenient viewing.

The generator has rack mount adapters on the sides. For convenience, we recommend that users purchase a pair of chassis slides when rack mounting.

2.2 ELECTRICAL INSTALLATION

2.2.1 Power Connection

NOTE

Unless otherwise specified at the time of purchase, this instrument was shipped from the factory with the power transformer connected for operation on a 105 - 125 Vac line supply and with a 1½ amp slow-blow fuse.

Conversion for 90 to 110V, 180 to 220V or 210 to 250V operation requires resetting two switches on the rear panel. Set the two switches and select the fuse for the ac line voltage according to the following table.

AC Line Voltage	Switch A	Switch B	Fuse (SB)
90 - 110	115	LO	1½ amp
105 - 125	115	HI	1½ amp
180 - 220	230	LO	¾ amp
210 - 250	230	HI	¾ amp

Connect the ac line cord to the mating connector at the rear of the unit.

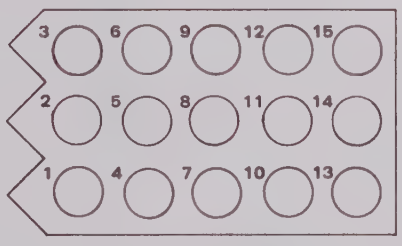
2.2.2 Signal Connections

Use 50Ω shielded cables equipped with female BNC connectors to distribute CH outputs, SYNC OUT and SYNC IN signals when connecting this instrument to associated equipment.

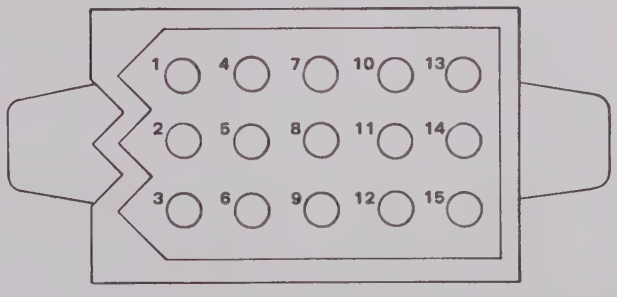
2.2.3 Control Connections

The remote (ASCII DATA IN/OUT) rear panel connection, harness wire colors, pin connections and signal names are given in tables 2-1 and 2-2.

The remote connector is a Molex 03-09-1151 which mates with a Molex 03-09-2151 connector housing with up to 15 Molex 02-09-2118 pin contacts. Pin contacts are prepared using a Molex Model A6973 Crimping Tool to connect No. 18 or No. 22 wire (strip back 1/10 to 1/8 inch).



MOLEX 03-09-1151



MOLEX 03-09-2151

Figure 2-1. Connectors (Socket/Pin Sides)

Table 2-1. ASCII DATA IN/OUT AND HARNESS CONNECTORS

	Connector					
	ASCII Data In/Out (Rear Panel)		Keyboard Harness		Display Harness	
Pin	Wire Color	Signal	Wire Color	Signal	Wire Color	Signal
1	1	PCOM				
2	2					
3	3	KINH	2	KINH		
4			1	+5V	7	+5V
5	5	GND				
6	6	BUSY				
7	7	COM	91	COM	0	COM
8	8	XD2	8	KD2	1	DCLK
9	9	XD4	5	KD4		
10	90	XD3	3	KD3	2	DD0
11	91	XD1	7	KD1	4	DD2
12	92	XD5	4	KD5		
13	93	XD0	90	KD0	6	DSYNC
14	94	XD6	6	KD6	3	DD3
15	95	XCLK	9	KCLK	5	DD1

Code	Color	Code	Color
0	Black	8	Gray
1	Brown	9	White
2	Red	90	White with black tracer
3	Orange	91	White with brown tracer
4	Yellow	92	White with red tracer
5	Green	93	White with orange tracer
6	Blue	94	White with yellow tracer
7	Violet	95	White with green tracer

PCOM: Input Program Common (connected to signal common unless isolation configuration)
KINH: Keyboard Inhibit
GND: Safety Ground
BUSY: Not Ready for New Data
COM: Signal Common or Keyboard Ground
X: External
D: Data
0 - 6: Bits 0 thru 6
CLK: Clock
K: Keyboard
D: Display

True = Low
False = High
TTL Voltage Level

Table 2-2. KEY, ASCII, HEXADECIMAL AND BINARY CODES FOR PROGRAMMING FUNCTIONS

Control and Data Names	Model 152 Key	ASCII Character and TTY Keyboard	Hexa-Decimal Code	Binary (and ASCII Bus) Bit 7 XD6	Bit 6 XD5	Bit 5 XD4	Bit 4 XD3	Bit 3 XD2	Bit 2 XD1	Bit 1 XD0
Range (X 10 mult)*		(Space)	20	0	1	0	0	0	0	0
Invert phase/offset	CHS	–	2D	0	1	0	1	1	0	1
0	0	0	30	0	1	1	0	0	0	0
1	1	1	31	0	1	1	0	0	0	1
2	2	2	32	0	1	1	0	0	1	0
3	3	3	33	0	1	1	0	0	1	1
4	4	4	34	0	1	1	0	1	0	0
5	5	5	35	0	1	1	0	1	0	1
6	6	6	36	0	1	1	0	1	1	0
7	7	7	37	0	1	1	0	1	1	1
8	8	8	38	0	1	1	1	0	0	0
9	9	9	39	0	1	1	1	0	0	1
Peak amplitude	AMPL	A	41	1	0	0	0	0	0	1
Output channel	CHNL	B	42	1	0	0	0	0	1	0
Function (waveform)	FUNC	C	43	1	0	0	0	0	1	1
Reference offset	OFST	D	44	1	0	0	0	1	0	0
Range (X 10 mult)*	MULT	E	45	1	0	0	0	1	0	1
Frequency	FREQ	F	46	1	0	0	0	1	1	0
Unit select address	UNIT	G	47	1	0	0	0	1	1	1
Phase angle	ANGL	H	48	1	0	0	1	0	0	0
Execute	EXEC	I	49	1	0	0	1	0	0	1

1 = True = Low
0 = False = High
TTL Voltage Level

*See the second entry of this control name.

2.2.4 Isolation and Keyboard Inhibit

The Model 152 may be controlled by a remote controller whose system ground reference is separated from the instrument signal common. With this isolation, the input program common remains separated from the instrument signal common. Most options include isolation; option 152-001 is the isolation only option. The optical isolators used provide up to 1500 volts of signal isolation. (Optical isolation reduces character programming rate to 10 kHz.)

Frame ground is connected to the instrument chassis and the third (green wire) pin on the power plug.

To disable the Model 152 keyboard, the keyboard inhibit line must be connected to the signal common. With most options, a programmable relay for disabling is provided to ensure isolation. The keyboard inhibit line nominal open circuit voltage is 3 volts with respect to signal common.

SECTION 3
CIRCUIT OPERATION

3.1 INITIAL CHECKOUT

To ensure that the generator is operating properly, make the power and interface connections (Section 2). Operate the generator, function-by-function, as described in the following paragraphs.

3.2 CONTROLS, INDICATORS AND PROGRAMMING

The generator has a 20 pushbutton front panel keyboard to provide the same control as the 20 remotely programmed ASCII character bytes.

The 20 generator controls and their various code conversions are listed in table 2-2. The generator front panel controls and indicators are shown in figure i.

3.2.1 Power

Power is turned on and off with the PWR pushbutton. When the power is turned on, the generator is automatically addressed and is ready to accept commands. If a different generator is to be addressed, use the UNIT control (refer to paragraph 3.2.4). Also, when the power comes on, the generator is in standby state until properly programmed. While in this state, the display may show improper indications.

3.2.2 Indicators

The indicators turn on to show the various functions, values, sign and address programmed; the numerals displayed are significant as frequency, amplitude, phase angle or offset, but only one category at any one time. For frequency, amplitude and offset, scientific notation is displayed. (Scientific notation is ().()() (), where the first three () are significant digits and the last () is a power of ten, a multiplier.) For phase angle, a 3 digit whole number and a 1 digit decimal are displayed; the power of ten display is always zero.

The digits are displayed in the order of entry, shifting right-to-left as shown in table 3-1. (Only the last entered set of significant digits and the last entered digit for the power of ten are stored for any given address, such as frequency, amplitude, etc. Any previously entered digits are shifted out of memory.)

Table 3-1. EXAMPLE OF PROGRAMMING

Sequence	Wavetek Keyboard	Remote ASCII	Lighted Display
1	UNIT	G	–
2	1	1	UNIT SELECTED
3	FREQ	F	FREQ
4	5	5	0.05
5	7	7	0.57
6	9	9	5.79
7	MULT	E	–
8	3	3	3 (Power of Ten)
9	CHNL	B	–
10	1	1	CHNL 1
11	FUNC	C	–
12	0	0	SIN
13	AMPL	A	AMPL
14	5	5	0.05
15	0	0	0.50
16	0	0	5.00
17	MULT	E	–
18	0	0	0 (Power of Ten)
19	EXEC	I	–

NOTE

The output signal will not appear until "EXEC" is commanded.

3.2.3 Programming

Programming is mostly a matter of prefixing, by sequence, the numerical values and numeric codes with their intended use. For example, programming a 5.79 kHz, 5.00V peak sine wave on Channel 1 of Unit No. 1 is given in table 3-1.

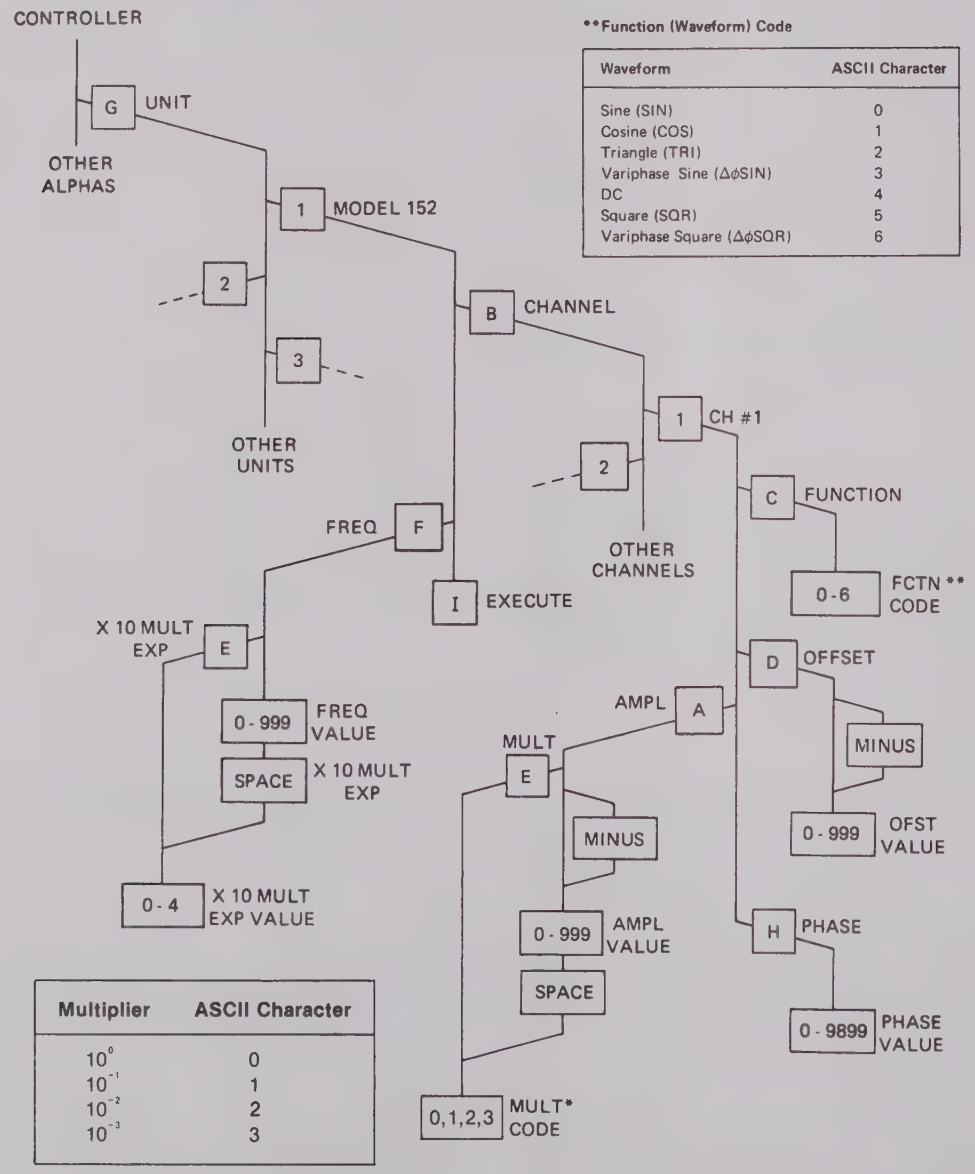
Generally, alpha characters (A thru I) are subsection addresses and are usually followed by one or more numeric digits representing a value or control selection.

A graphical representation of programming the 152 is shown in figure 3-1, where each programmed character allows

further access into a branching network or allows an exit from one branch and an entrance to another. The example in table 3-1 applied to figure 3-1 shows how programming G1, or pressing the UNIT and the 1 keyboard keys, gains access to the "Model 152" branch. Programming F, or pressing the FREQ key, gives access to the frequency branch of the Model 152. After the values of frequency are programmed, another branch is selected, etc., until the 152 is programmed as desired. The EXEC key, or programmed I, transfers the programmed, or keyed, data into D-to-A converters for an actual generator output.

NOTE

Any character may be separated by spaces, periods or other characters not defined here. Spaces may be inserted between alpha control characters and numeric fields; however, a space will move from a value field to the exponent field (where scientific notation is used) after at least one numeric digit has been received. (See paragraphs 3.2.6 and 3.2.7.)



**Function (Waveform) Code

Waveform	ASCII Character
Sine (SIN)	0
Cosine (COS)	1
Triangle (TRI)	2
Variphase Sine (ΔϕSIN)	3
DC	4
Square (SQR)	5
Variphase Square (ΔϕSQR)	6

Multiplier	ASCII Character
10^{0}	0
10^{-1}	1
10^{-2}	2
10^{-3}	3

Figure 3-1. Programming Branch Network

The 152 generates a busy signal while calculating sine and cosine values. The channel number cannot be changed while the busy signal is asserted.

If a phase angle value is followed by an execute, all registers except phase will be updated immediately and phase angles will be updated 1 to 2 ms later when the sine calculator provides the values.

The generators are designed to accept a scientific notation input format. Additional user information for system programming is included in Appendix A.

The following paragraphs describe the program elements and give their ASCII codes. The Model 152 front panel keys correspond one-for-one with the ASCII codes; if there is any doubt as to correspondence, refer to table 3-2.

Table 3-2. KEYBOARD TO ASCII CONVERSION TABLE

Keyboard	ASCII	Keyboard	ASCII
AMPL	A	MULT	(Space) or E
UNIT	G	ANGL	H
OFST	D	EXEC	I
CHNL	B	0 thru 9	0 thru 9
FUNC	C	CHS	– (Minus)
FREQ	F		

3.2.4 Unit Selected Address

After the unit prefix (G), program one digit to select the unit. The unit addressed in a multiple unit group responds to subsequent commands; other units do not. Generators are given the address of 3 at the factory unless specified otherwise at the time of purchase. Address changes are easily made in the field. Subsequent instructions will be accepted by the last unit addressed.

3.2.5 Function (Waveform)

Waveform	ASCII Character
Sine (SIN)	0
Cosine (COS)	1
Triangle (TRI)	2
Variphase sine (ΔϕSIN)	3
DC	4
Square (SQR)	5
Variphase square (ΔϕSQR)	6

After the function prefix (C), program one digit to select the desired waveform or DC voltage. Waveforms or DC voltage can be inverted during amplitude selection.

3.2.6 Frequency and Multiplier

After the frequency prefix (F), program a 3 digit number (1.00 to 9.99) for the three most significant digits; after the multiplier prefix (E or space), program the power of 10 (0 thru 4).

3.2.7 Amplitude and Multiplier

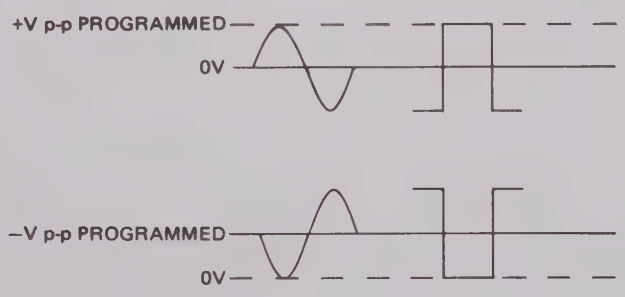
After the amplitude prefix (A), program (–) if waveform inversion is desired (triangle and variphase sin cannot be inverted); then, program a 3 digit number (0.00 to 9.99) for the three most significant digits. After the multiplier prefix (E or space), program the power of 10 (0, 1, 2 or 3). Powers 1, 2 and 3 are automatically accepted as –1, –2, and –3. Amplitude programmed is peak voltage.

Function	Inversion	Power	Code
SIN	Yes	10^0	0
COS	Yes	10^{-1}	1
TRI	No	10^{-2}	2
ΔϕSIN	No	10^{-3}	3
DC	Yes		
SQR	Yes		
ΔϕSQR	Yes		

NOTE

DC offset plus waveform peak value may not exceed 100 mA peak load current.

All waveforms have a center reference level. Notice the inversion caused by programming –V peak. Normal waveforms start in the positive direction regardless of their offset. Inverted waveforms start in the negative direction regardless of their offset.



3.2.8 Signal Reference Offset

After the offset prefix (D), program (–) if negative offset is desired; then, program a 3 digit number (0.00 to 9.99) for the offset.

Offset control allows the generator output reference level to be offset, or displaced positive or negative to 10V. All waveforms have a center reference level from which the offset is made.

NOTE

DC offset plus waveform peak value may not exceed 10V peak into an open circuit or 5V peak into 50Ω.

3.2.9 Phase Angle

After the phase angle prefix (H) program a 4 digit number (000.0 to 359.9) to change the phase angle of the channel programmed.

3.2.10 Execute

Programming execute (I) enables the output by transferring data from the program buffer to the working buffer.

3.3 OPERATING PROCEDURE

No preparation for operation is required beyond the completion of the initial installation checks. Allow the generator and associated equipment to warm up for specified generator accuracies. Refer to the control descriptions given in paragraph 3.2 for actual keyboard or remote commands.

NOTE

Use the same length of RG58 for all channel cables.

3.3.1 Operating as a Basic Waveform Generator

Simply program the desired waveform, frequency, amplitude and offset for each channel.

3.3.2 Operating as a DC Voltage Source

DC voltage output is ±10V, 100 mA obtained by using the DC function.

1. Select DC function.
2. Program the desired voltage and polarity.

3.3.3 Operating as a Variphase Generator

An output is phase shifted with respect to the sync output, sync input from another source or with respect to the other output channel.

NOTE

The accuracy of phase angle is defined between two variphase sine or square selected channels only.

1. Connect external sync if desired.
2. Program the desired waveform, frequency, amplitude and offset. (If external sync is used, sync and program frequencies must be within 1%. The waveform for the phase shifted channel must be either variphase sine or variphase square.)
3. Program the desired phase angle for the channel with the variphase waveform.

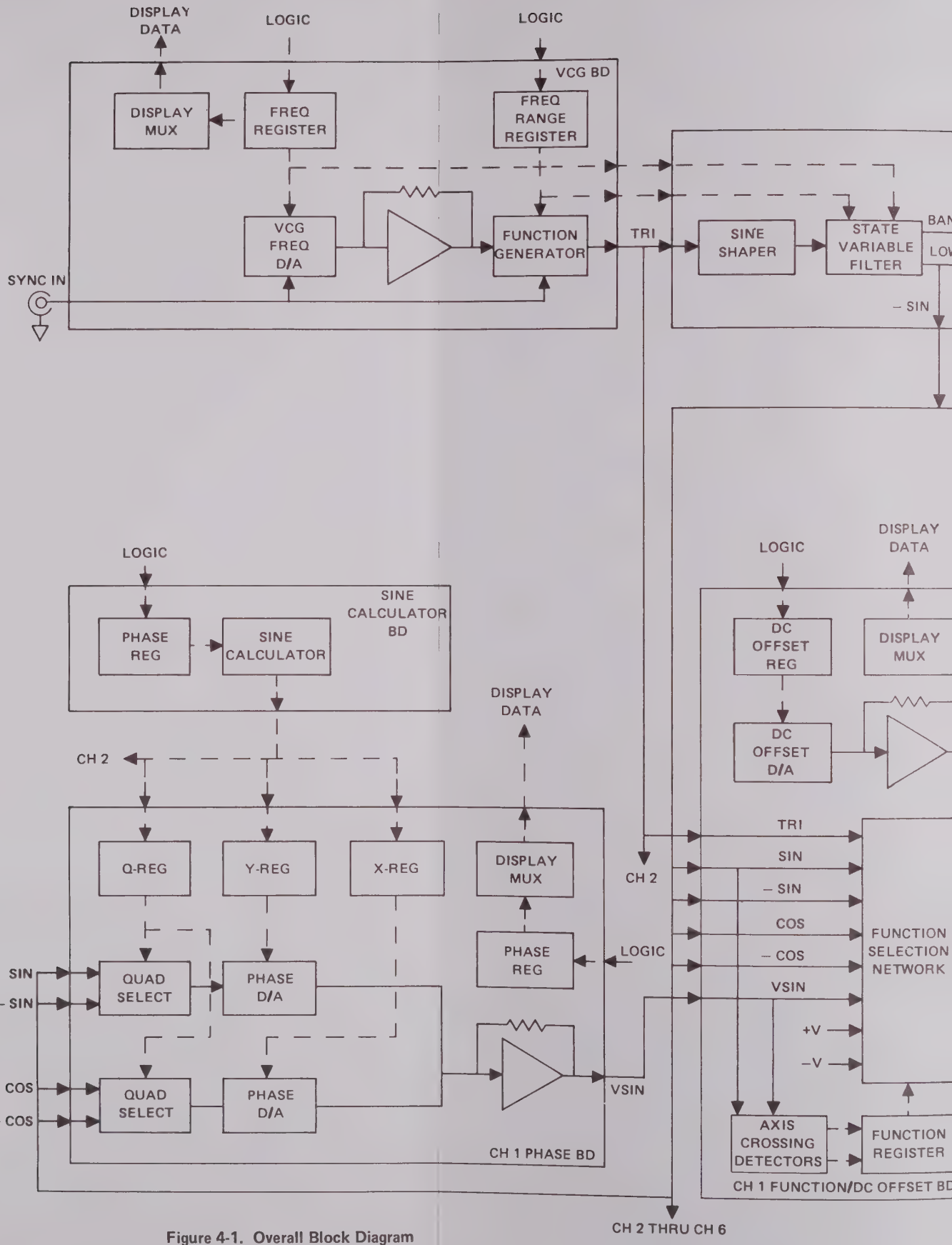
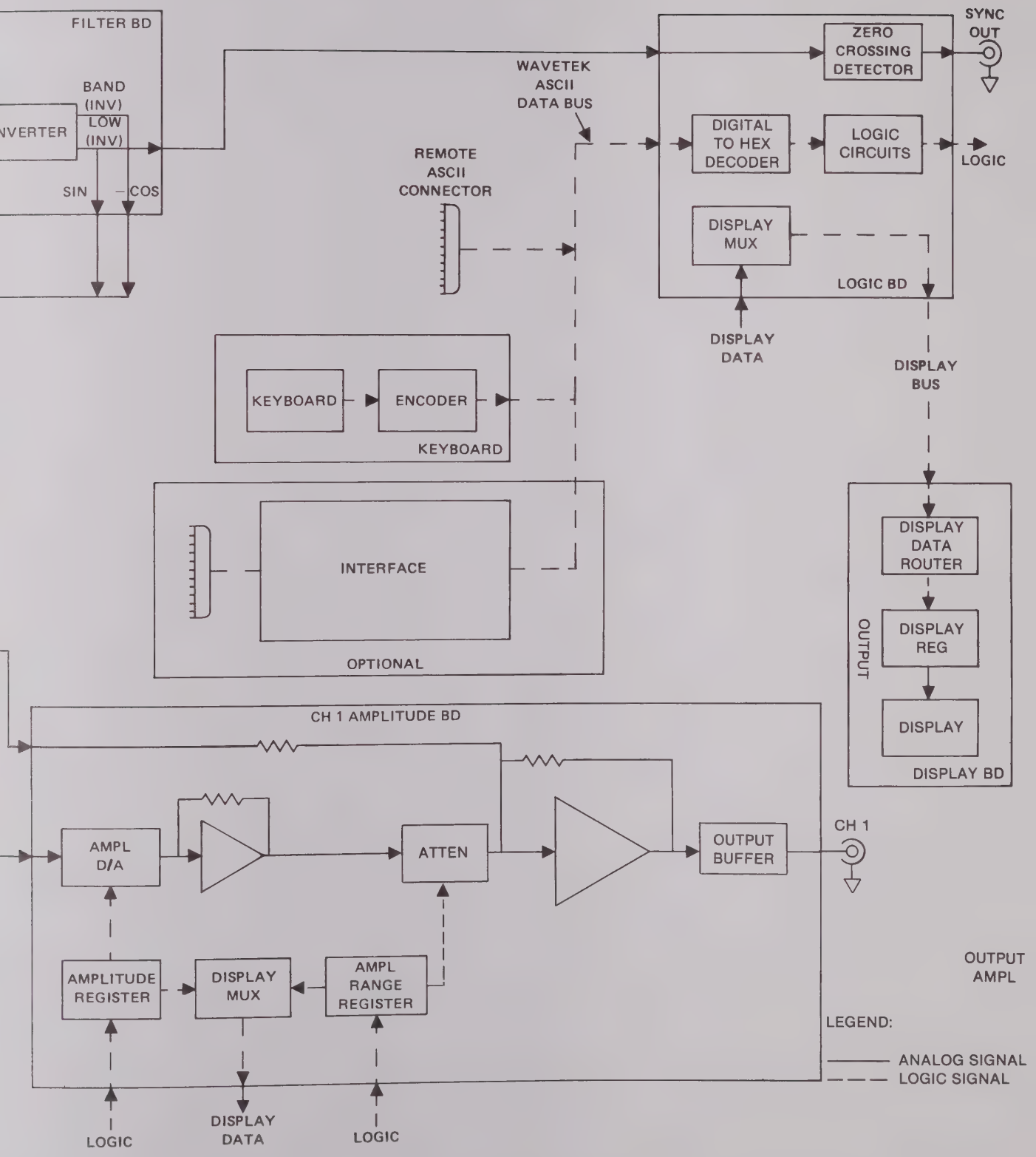


Figure 4-1. Overall Block Diagram


FILTER BD
BAND (INV)
LOW (INV)
NVERTER
SIN
COS
WAVETEK ASCII DATA BUS
REMOTE ASCII CONNECTOR
ZERO CROSSING DETECTOR
SYNC OUT
DIGITAL TO HEX DECODER
LOGIC CIRCUITS
LOGIC
DISPLAY MUX
LOGIC BD
DISPLAY DATA
DISPLAY BUS
KEYBOARD
ENCODER
KEYBOARD
INTERFACE
OPTIONAL
DISPLAY DATA ROUTER
DISPLAY REG
DISPLAY
OUTPUT
DISPLAY BD
CH 1 AMPLITUDE BD
AMPL D/A
ATTEN
OUTPUT BUFFER
CH 1
AMPLITUDE REGISTER
DISPLAY MUX
AMPL RANGE REGISTER
OUTPUT AMPL
LEGEND:
ANALOG SIGNAL
LOGIC SIGNAL
LOGIC
DISPLAY DATA
LOGIC

SECTION 4
CIRCUIT DESCRIPTION

4.1 LOGIC NOTATION AND TERMINOLOGY

To avoid confusion in determining logic states, please read and understand the following ground rules used in this manual.

1. On the schematics, all signals are true-when-high unless their mnemonics are overscored; the overscore indicates true-when-low.

2. Pulse and clock refer to transient change of state, whereas status refers to a logic state which requires new input to change.

4.2 BASIC OPERATION

The overall operation can be easily followed in figure 4-1. All digital programmed ASCII data, via the keyboard, the remote ASCII connector or optional interface card, is decoded into hexadecimal data on the logic interface board. The data is then distributed throughout the logic control circuitry to program all of the holding registers which control the operation of the generator. The SYNC OUT provides TTL compatible waveforms used for triggering purposes. The logic interface board also includes the data multiplexing circuitry for the display data. The display data is multiplexed into the display bus for display panel illumination. The routing of the correct data to the correct display is determined by a clock pulse and sync pulse on this bus.

The function generator generates symmetrical triangle and square waveforms simultaneously. Since this is a voltage controlled generator, the integrating current, frequency, is easily controlled with a D/A. The frequency range register selects the range integrating capacitor. The generator frequency can be synchronized to an external source through the SYNC IN BNC connector.

The triangle is fed to the filter board where it is shaped into a sine wave by diode nonlinearity. The state variable filter creates a sine/cosine relationship by using a frequency tracking bandpass and low pass filter. The filter outputs are buffered and inverted to create the quadrature components of the sinusoidal waveform.

To control the phase angle of the variphase sine wave, a fundamental trigonometric identity is used, sine $(\omega t + \theta)$ = cos θ sin ωt + sin θ cos ωt, where sin $(\omega t + \theta)$ is an expression of relative signal amplitude of between 1 and -1 at time t when starting at angle θ. Sin ωt and cos ωt are the sine and cosine functions created by the state variable filter where $\omega = 2\pi$ frequency. Sin θ and cos θ are computed at the sine calculator board from the program phase angle θ. These computed values are transferred to the phase board where they are multiplied by sin ωt and cos ωt with the phase D/As. The phase D/A outputs are summed to create the sin $(\omega t + \theta)$ variphase sine wave and then transferred to the offset/function board.

Axis crossing detectors are used to create TTL signals which are in phase with the sine and variphase sine waves. These TTL signals are fed into the function selection network via the function register and used to alternately select between the +V and $-$V inputs to the function selection network. When the square or variphase square waveforms are selected, the output of the function selection network will be a square wave with peaks equal to the $\pm$V inputs of the function selection network. In other modes the function register will inhibit the axis-crossing created TTL signals and cause the function selection network to select one of the other six inputs besides the +V and $-$V inputs for output to the amplitude board.

This output is transferred to the amplitude board where the signal amplitude is controlled by means of the amplitude register and the amplitude D/A. The signal is then decade attenuated with a programmable amplifier before being fed into an output amplifier. The offset voltage from the offset D/A (function/offset board) is also injected at this summing node. The output amplifier consists of a fast differential input amplifier and a high current gain amplifier to provide $< 1\Omega$ output impedance and 100 mA maximum current capabilities.

SECTION 5
CALIBRATION

5.1 FACTORY REPAIR

Wavetek maintains a factory repair department for those customers not possessing the necessary personnel or test equipment to maintain the instrument. If an instrument is returned to the factory for calibration or repair, a detailed description of the specific problem should be attached to minimize turnaround time.

5.2 REQUIRED TEST EQUIPMENT

DVM
Oscilloscope, Dual Channel With Comparator and Differential Inputs
Counter
Distortion Analyzer

5.3 CALIBRATION

After referring to the following preliminary data, perform calibration, as necessary, per table 5-1. If performing partial calibration, check previous settings and adjustments for applicability.

1. Refer to appropriate board assembly drawings for test point and adjustment locations.

2. TPs (Test Points) and adjustments are prefixed as follows:

A1	Power Supply
A2	VCG Board
A3	Filter Board
A4	Channel 1 Phase Board
A5	Channel 2 Phase Board
A6	Channel 1 Offset/Function Board
A7	Channel 2 Offset/Function Board
A9	Channel 1 Amplitude Board
A10	Channel 2 Amplitude Board

3. Before connecting the unit to an ac source, check the ac line circuit to make sure the 115/230 and HI/LO switches are set at the correct position (see paragraph 2.2.1).

CAUTION

To prevent component damage, turn off line power before removing and replacing circuit boards.

NOTE

When it is necessary to turn off power during calibration, programming will be lost. For correct programming after power-on, note programming at power-off or reestablish programming starting with paragraph 5.3, step 4.

4. Start the calibration by executing the following program:

Frequency	9.99E2	Channel	2
Channel	1	Amplitude	9.99E0
Amplitude	9.99E0	Offset	0.00
Offset	0.00	Function	0
Function	0	Angle	0
Angle	045.0	Execute	
Execute			

5. Allow the unit to warm-up at least 30 minutes prior to final calibration.

6. Open columns in table 5-1 indicate data from previous step remains applicable.

Table 5-1. CALIBRATION CHART

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
1	Power supply regulation	DVM	Across A2C2 (neg side to DVM com)	See initial conditions	A1R28	+15 Vdc ±10 mV	Put VCG board on extender.
2			Across A2C4 (pos side to DVM com)		NA	−15V reading same as +15V reading ±5 mV	

Table 5-1. CALIBRATION CHART (Continued)

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
3	Power supply regulation	DVM	Across A1C8 (6000 μF) (neg terminal to DVM com)	See initial conditions	A1R2	+5.020 Vdc ±5 mV	Put VCG board on extender.
4	Square wave time sym	Scope	A2TP6		A2R55	Horiz (time) sym error < 0.1%	
5				Freq 1.00E3	A2R66		Repeat steps 4 and 5, as necessary, for correct adjustment.
6	Freq tracking	Counter	CH 1 BNC	Freq 9.99E3	A2R10	9.99 kHz	
7				Freq 1.00E3	A2R32	1.00 kHz	Repeat steps 6 and 7, as necessary, for correct adjustment.
8	Freq linearity			Freq 9.99E0	A2R10	9.99 Hz	
9				Freq 9.99E1		99.9 Hz	
10				Freq 9.99E2		999 Hz	
11				Freq 9.99E3		9.99 kHz	Leave A2R10 at best freq agreement on these ranges.
12				Freq 5.00E4	A2C41	50.00 kHz	
13				Freq11.00E4 thru 9.99E4 in 2.25 increments		Best linearity	
Replace VCG board and put filter board on extender. Ensure that no external sync cable is connected to scope.							
14	Distortion	Scope (differential input)	A3 1V SINE TP	Freq. 9.99E2 A2R3 Centered	A3R22 A3R23	±0.5V peaks ±2 mV	
15		Distortion analyzer			A3R2 A3R22	Lowest distortion with smooth residue (minimum 2nd harmonic)	
16		Scope (differential input)			A3R23	1.00V p-p ±4 mV	

Table 5-1. CALIBRATION CHART (Continued)

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
17	Filter balance	Scope (differential input)	A3C37 (sin)	Freq 9.00E3	A3R60	No dc offset	Connect scope probe to front side of capacitor.
18				Freq 1.09E3	A3R114		
19				Freq 1.90E3	A3R113		
20			A3C44 (cos)	Freq 9.00E3	A3R52		
21				Freq 1.09E3	A3R55		
22				Freq 1.90E3	A3R64		
23				Freq 9.99E3		< 10 mV offset	If > 10 mV, repeat steps 17 - 23.
24			A3C37 (sin)				
25	Filter buffers		A3 + SINE TP	Freq 8.00E2	A3R30 A3R110	±5.000 Vp ±5 mV	Connect scope probe to test point.
26			A3 – SINE TP		A3R112		
27			A3 – COS TP		A3R29 A3R106		
28			A3 + COS TP		A3R108		
29	Filters freq E4 balance		A3 + SINE TP A3 – COS TP	Freq 5.00E4	A3C41	+ sin, – cos ampl = to each other	Ensure scope probe is properly compensated for HF measments.
30					A3C48 A3R25	+ sin and – cos amplitudes ±5.000V ±20 mV peak	*NOTE: A3C48 balances the filters to the program freq. A3R25 acts only as an absolute amplitude control and is useful in balancing out the freq E4 range.* Repeat steps 29 and 30, as necessary, for proper calibration.
31				Freq 9.99E4		±5.00V ±100 mV peak + sin and – cos	If tolerance is met, skip step 32.

Table 5-1. CALIBRATION CHART (Continued)

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
32	Filters freq E4 balance	Scope (differential input)	A3 + SINE TP A3 – COS TP	Freq 9.99E4	A3R25	±5.00V ±100 mV peak + sin and – cos	Repeat steps 30, 31 and 32 until + sin and – cos amplitudes track within ±200 mV of ±5V from freq 1.00E4 thru 9.99E4.
33	CH 1 phase		A4TP1	Freq 8.00E2	A4R1 A4R2	±5.000 Vp ±5 mV	Replace filter board and put channel 1 phase board on extender.
34	CH 2 phase		A5TP1		A5R1 A5R2		Replace channel 1 phase board and put channel 2 phase board on extender.
35	CH 1 offset	DVM	A6TP1	CH 1 Func 4 Ampl 0.00E0 Ofst 9.99	A6R3	–9.99 Vdc	Replace channel 2 phase board and put channel 1 ofst/func board on extender.
36				Ofst –9.99	A6R4	+9.99 Vdc	Program – key.
37	CH 1 amplitude		A9TP5	Func 5 Freq 0.50E0 Ampl 9.99E0 Ofst 0.00	A6R2 A6R1	+9.99V + peak –9.99V – peak	
38	Ch 2 offset		A7TP1	Ch 2 Func 4 Ampl 0.00E0 Ofst 9.99	A7R3	–9.99 Vdc	Replace channel 1 ofst/func board and put channel 2 ofst/ func board on extender.
39				Ofst –9.99	A7R4	+9.99 Vdc	
40	CH 2 amplitude		A10TP3	Func 5 Ampl 9.99E0 Ofst 0.00	A7R2 A7R1	+9.99V + peak –9.99V – peak	
41	CH 1 output ampl		CH 1 BNC	Ch 1 Freq 0.50E0 Ampl 0.00E3 Ofst 0.00 Func 4	A9R59	0.00 Vdc ±5 mV	Put CH 1 ampl board on extender.
42				Ampl 0.00E2	A9R55		
43				Ampl 0.00E1	A9R69		

Table 5-1. CALIBRATION CHART (Continued)

Seq	Check	Tester	Calibration Points	Program	Control	Desired Results	Remarks
44	CH 1 output ampl	DVM	CH 1 BNC	Ampl 0.00E0 Func 5	A9R65	0.00 Vdc ±5 mV	
45				Ampl 9.99E0	A9R78	19.98V p-p square	Set A9R78 so that the ± peak amplitudes give a magnitude of 19.98V.
46	CH 1 output offset			Ampl 0.00E0 Ofst 9.99	A9R81	9.99 Vdc ±5 mV	
47				Ofst –9.99		–9.99 Vdc ±10 mV	A9R81 may be reset for best results between ± ofst.
48	CH 2 output ampl		CH 2 BNC	CH 2 Ampl 0.00E3 Ofst 0.00 Func 4	A10R59	0.00 Vdc ±5 mV	Replace channel 1 ampl board and put channel 2 ampl board on extender.
49				Ampl 0.00E2	A10R55		
50				Ampl 0.00E1	A10R69		
51				Ampl 0.00E0	A10R65		
52		Scope (differential input)		Ampl 9.99E0	A10R78	19.98V p-p square	Set A9R78 so that the ± peak amplitudes give a magnitude of 19.98V.
53	CH 2 output offset	DVM		Ampl 0.00E0 Func 4 Ofst 9.99	A10R81	+9.99 Vdc ±5 mV	
54				Ofst –9.99		–9.99 Vdc ±10 mV	A10R81 may be reset for best results between ± ofst.

SECTION 6
PARTS AND SCHEMATICS

6.1 DRAWINGS

The following assembly drawings (with parts list) and schematics are in the arrangement shown below.

6.2 ORDERING PARTS

When ordering spare parts, please specify part number, circuit reference, board, serial number of unit and the function performed.

6.3 ADDENDA

Under Wavetek's product improvement program, the latest electronic designs and circuits are incorporated into each Wavetek instrument as quickly as development and testing permit. Because of the time needed to compose and print instruction manuals, it is not always possible to include the most recent changes in the initial printing. Whenever this occurs, addendum pages are prepared to summarize the changes made and are inserted immediately inside the cover.

Drawing	Drawing No.
Chassis Assembly	152-010
Chassis Parts List	1101-00-0664
Power Supply Assembly	152-046
Power Supply Parts List	1101-00-0669
Power Supply Board Schematic	152-236
Power Supply Board Assembly	152-036
Power Supply Board Parts List	1100-00-0153
Display Board Schematic	152-254
Display Board Assembly	152-054
Display Board Parts List	1100-00-0149
Keyboard Schematic	152-256
Keyboard Assembly	152-056
Keyboard Parts List	1100-00-0154
Mother Board Assembly	152-034
Mother Board Parts List	1100-00-0670
Logic Interface Board Schematic	152-245
Logic Interface Board Assembly	152-045
Logic Interface Board Parts List	1100-00-0152

Drawing	Drawing No.
Sine Calculator Board Schematic	152-255
Sine Calculator Board Assembly	152-055
Sine Calculator Board Parts List	1100-00-0672
VCG Board Schematic	152-230
VCG Board Assembly	152-030
VCG Board Parts List	1100-00-0145
Filter Board Schematic	152-232
Filter Board Assembly	152-032
Filter Board Parts List	1100-00-0146
Phase Board Schematic	152-226
Phase Board Assembly	152-026
Phase Board Parts List	1100-00-0150
Offset, Function Board Schematic	152-227
Offset, Function Board Assembly	152-027
Offset, Function Board Parts List	1100-00-0148
Amplitude/Logic Board Schematic	152-228
Amplitude/Logic Board Assembly	152-028
Amplitude/Logic Board Parts List	1100-00-0147

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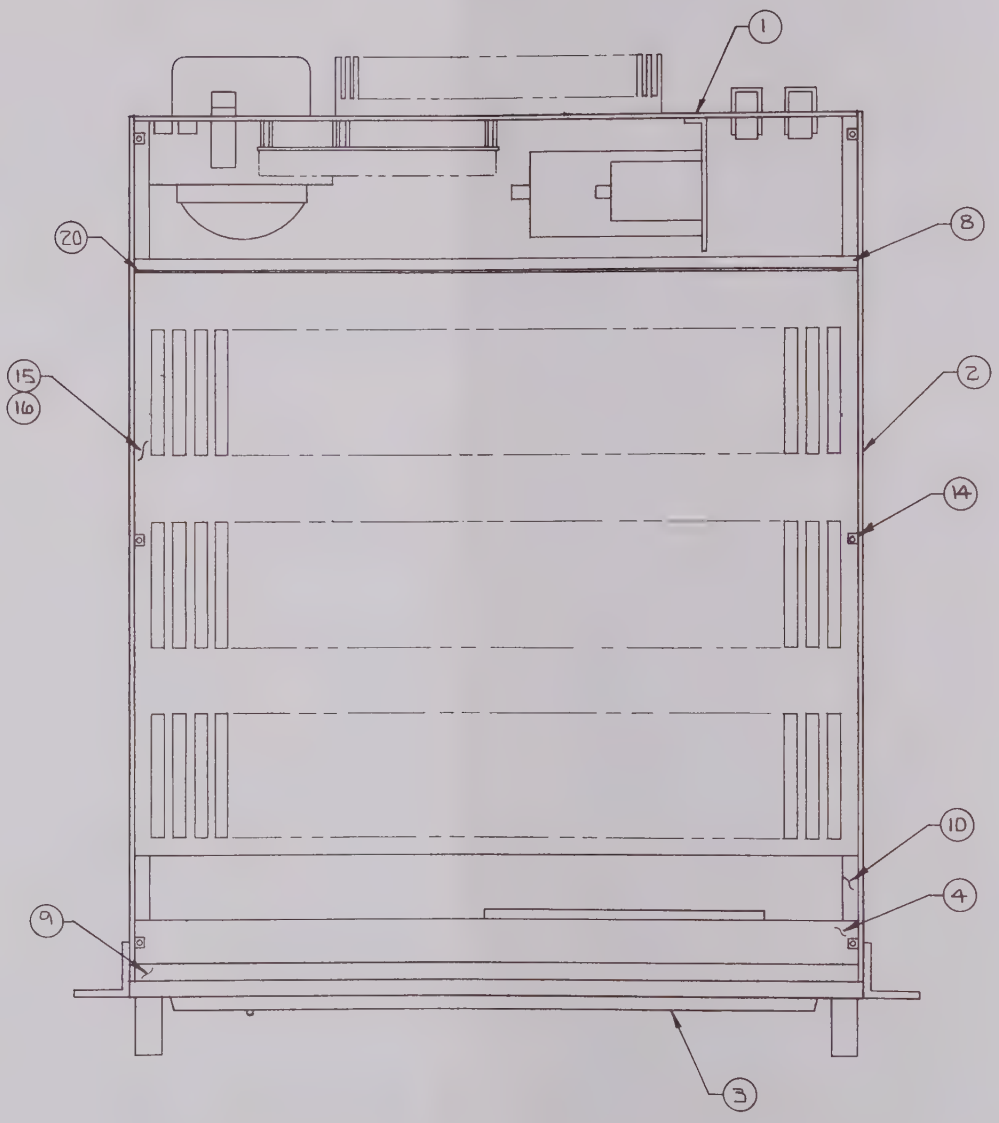

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP
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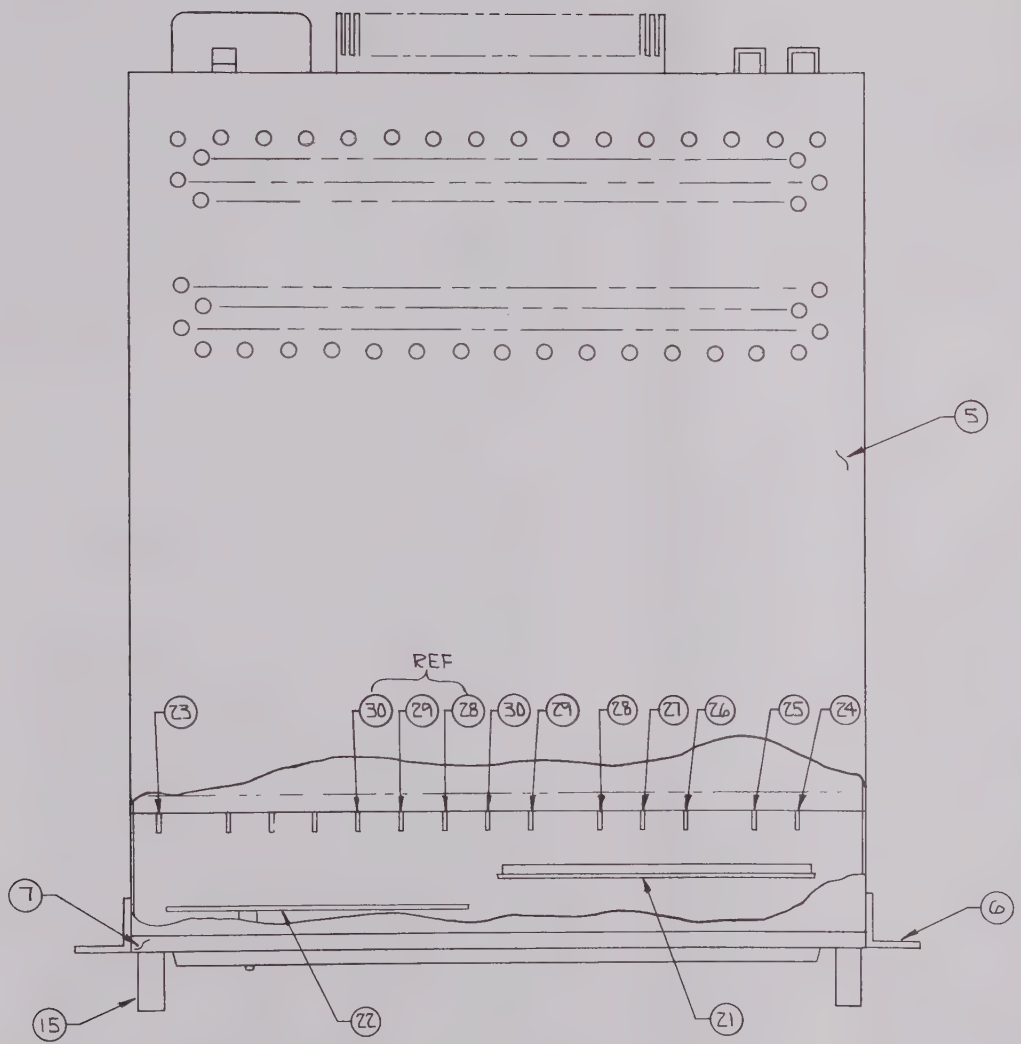
B	1817	DC	9/28/78	



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3-28-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY CHASSIS
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ± .010 ANGLES ±1° XX ± .030		
	DO NOT SCALE DWG	MODEL NO. 152	DWG NO. D152-010 REV B
	SCALE 1/2	CODE IDENT 23338	SHEET 1 OF 2

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REFEREN
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NONE
NONE
NONE
NONE
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PAR

REFERE
15
NONE
NONE
14
NONE
NONE

WA
PA

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	SIDE PLATE	152-316	WVTK	1400-00-8492	2
	FRONT PANEL	152-324	WVTK	1400-00-8500	1
	SUB PANEL	152-321	WVTK	1400-00-8513	1
	COVER,TOP	152-319	WVTK	1400-00-8522	1
	EARS,RACKMOUNT	152-318	WVTK	1400-00-8532	2
	TRIM	152-314	WVTK	1400-00-8541	2
	BAR,SUPPORT,MOTHER	152-308	WVTK	1400-00-8553	2
	BAR,SUPPORT,PANEL	152-322	WVTK	1400-00-8563	2
	BAR,SUPPORT,SIDE	152-315	WVTK	1400-00-8573	4
	PANEL,DISPLAY FROM:1400-00-0691	1400-00-8580	WVTK	1400-00-8580	1
	COVER,BOTTOM	1400-00-8932	WVTK	1400-00-8932	1
	BRACKET,FAN SUPPORT	1400-00-9213	WVTK	1400-00-9213	1
	BRACKET,PWR.SWITCH	1400-00-9233	WVTK	1400-00-9233	1
	GUIDE,BOARD	115-287	CALMK	2100-06-0004	90
	GUIDE PLATE	115-1123A	CLMRK	2100-06-0005	2
	FAN	760-126LF-2182-11115	ETRI	2600-00-0006	1
	TY-WRAP	TYB-23M	TB	2800-00-0006	10

TITLE	ASSEMBLY NO.	REV
CHASSIS	1101-00-0664	C
	PAGE: 1	

	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
	HANDLE	1052	USECO	2800-07-0019	2
	BAIL W/FEET,15 1/2	BAIL 15 1/2	BUKEY	2800-08-0001	1
	INSERT #8	74-11-108-13	SOTCO	2800-09-0018	6
	FAST,CHASSIS	1591-C11	USECO	2800-09-0022	12
	INSERT #10	74-11-210-13	SOTCO	2800-09-0026	8
	PLUG BUTTON	48152	UNCAR	2800-35-0001	3

TITLE	ASSEMBLY NO.	REV
CHASSIS	1101-00-0664	C
	PAGE: 2	

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE PARTS LIST CHASSIS
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° XX ±.030		
	DO NOT SCALE DWG		MODEL NO. 152 / DWG NO. 1101-00-0664 / REV C
	SCALE		CODE IDENT 23338 / SHEET 1 OF 1

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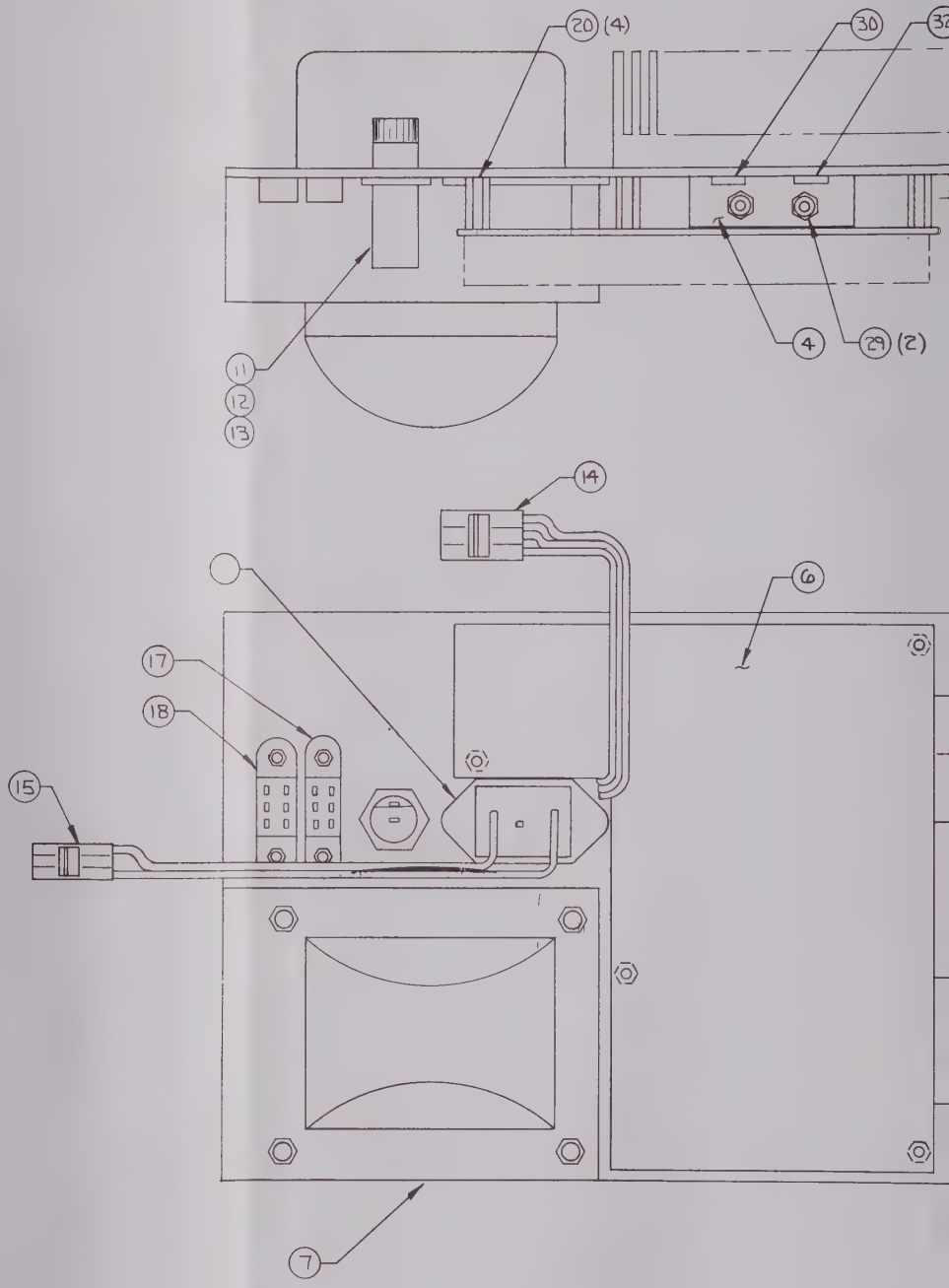
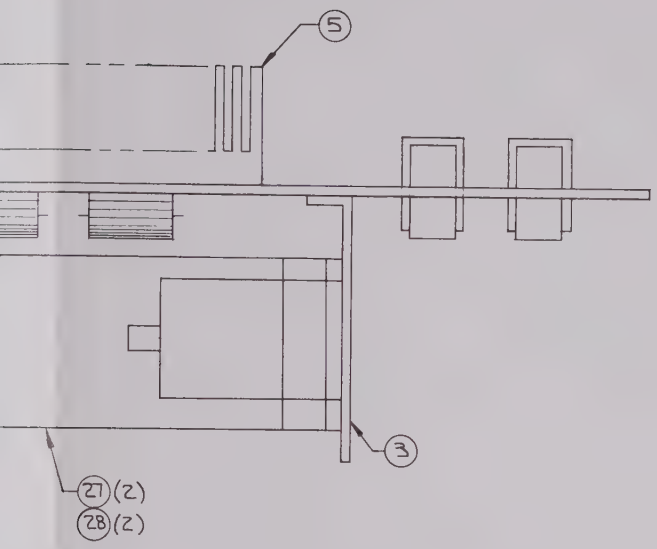
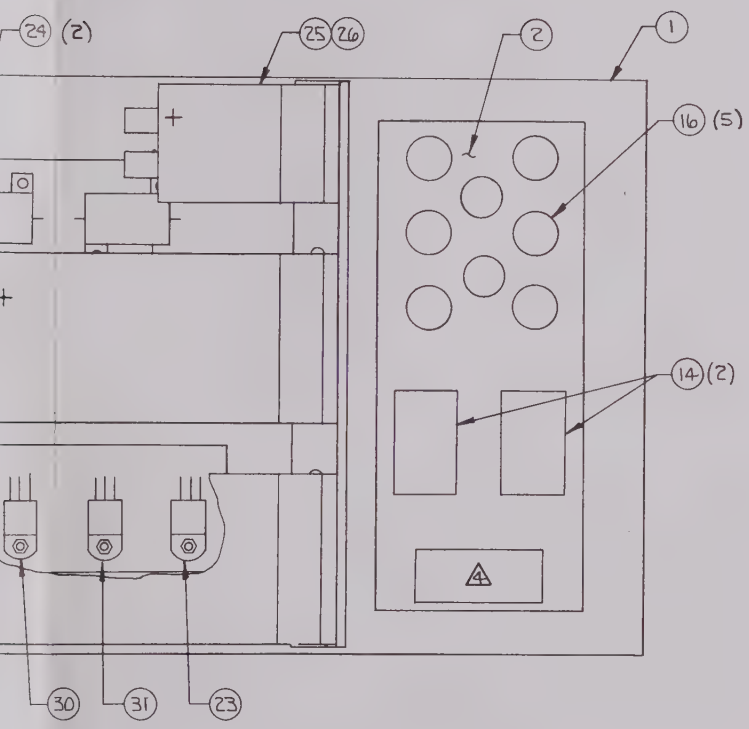


4. USED WHEN IEC INTERFACE IS INSTALLED ONLY.
3. FOR TRUE WIRING SEE SHT 2 & 3.
2. REAR CONN. MTG PLATE (ITEM 2) IS LAST ASSY TO BE MOUNTED ON REAR PANEL.
1. WIRES FROM 9 & 15 PIN MOLEX SHOWN FOR REF ONLY, APPROX. WIRE CORSE.

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP
A	NEW BBNC PLATE	BA	7-15-75	





REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3-26-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY POWER SUPPLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO. 152	DWG NO. D152-046 REV A
	SCALE 1/1	CODE IDENT 23338	SHEET 1 OF 4

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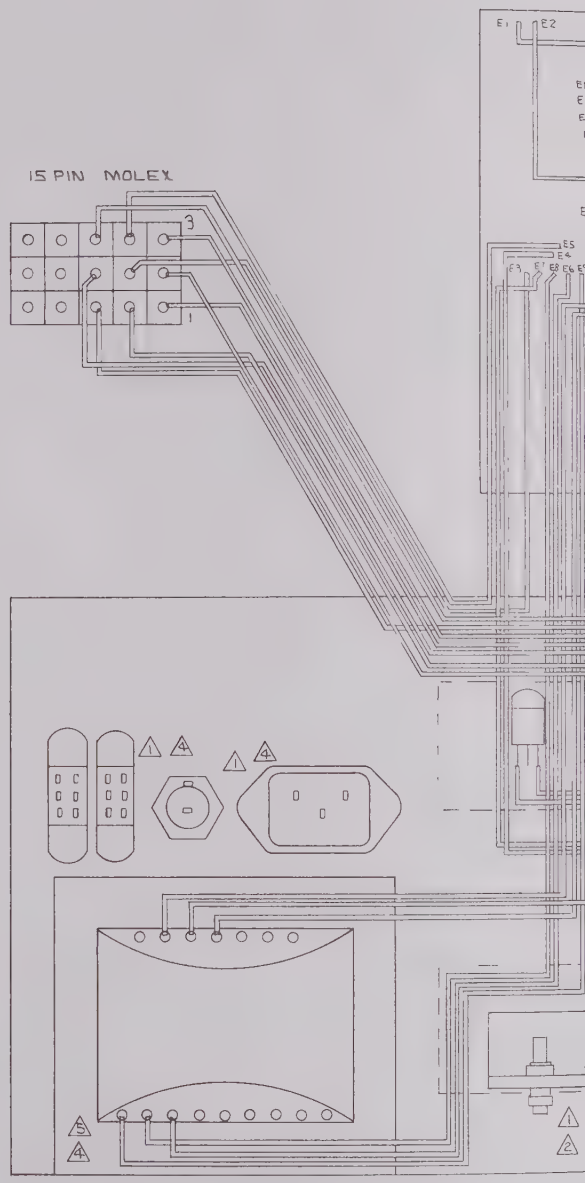
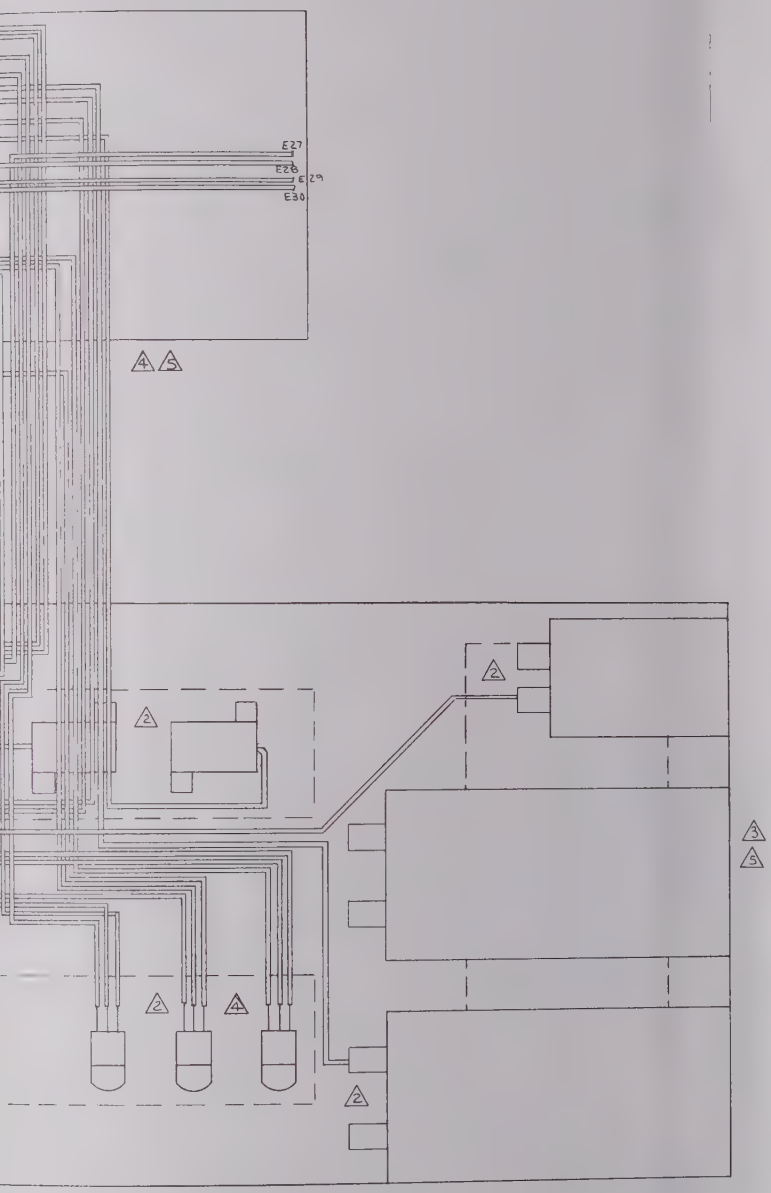


7. POWER SUPPLY BD. AND CAPACITORS SHOWN REMOVED FROM REAR PANEL.
6. ADD WIRE TIES AS REQUIRED
△5 ASSEMBLE LARGE CAPACITORS, (ON BRACKET), TRANSFORMER, AND POWER SUPPLY BD, (ASSEMBLED), TO REAR PANEL.
△4 INSTALL AND SOLDER ALL HARNESSES.
△3 MOUNT LARGE CAPACITORS TO MOUNTING BRACKET.
△2 SOLDER TIP'S 20W RESISTORS SOLDER LUGS FOR LARGE CAPACITORS AND TRANSISTORS TO WIRE HARNESS.
△1 INSTALL TRANSISTORS SWITCHES FUSE HOLDER AND A.C. RECEPTICAL TO REAR PANEL.

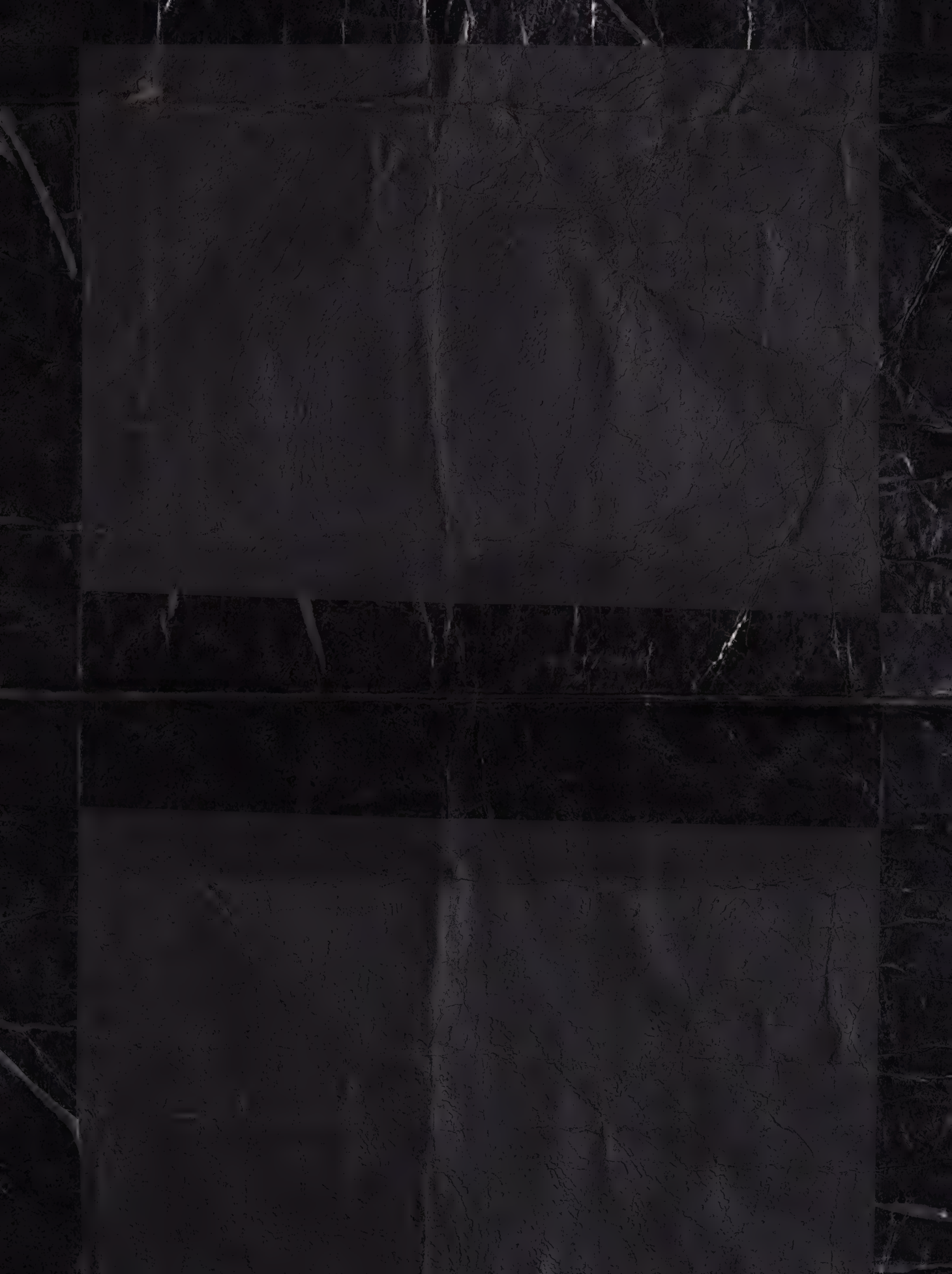
NOTE UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

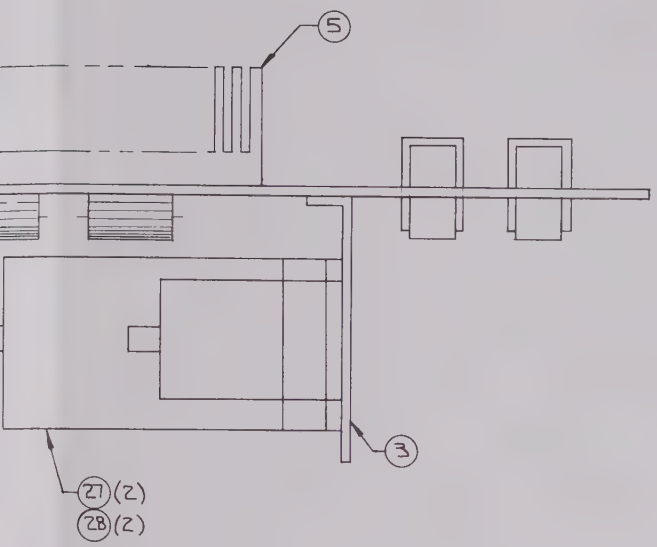
PPLY BD 152-1360

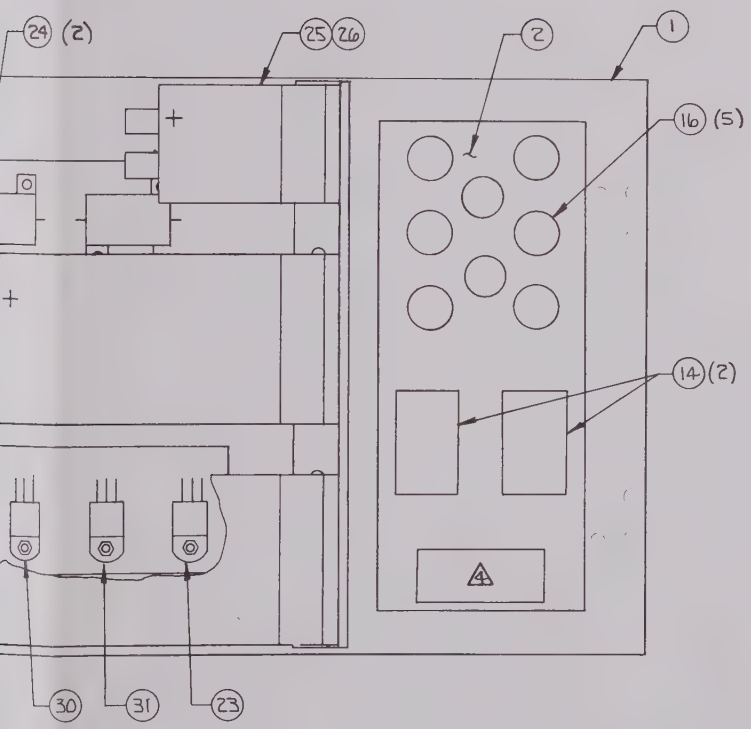


REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3-18-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY POWER SUPPLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG		MODEL NO 152 / DWG NO D152-046 / REV A
	SCALE		CODE IDENT 23338 / SHEET 2 OF 4



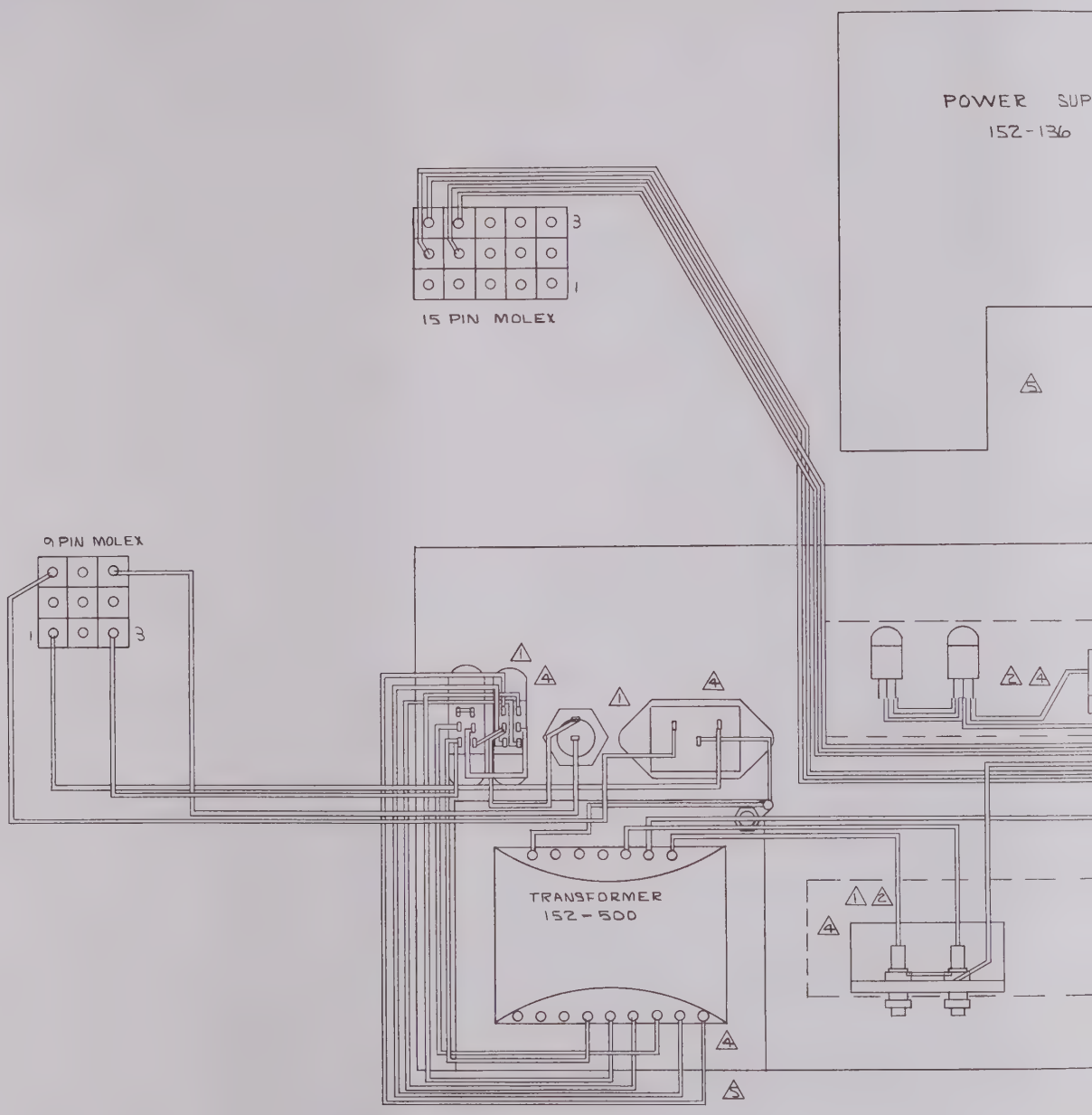
REV	ECN	BY	DATE	APP
A	NEW BBNC PLATE	BA	7-15-75	





REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3-26-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY POWER SUPPLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO. 152	DWG NO. D152-046 REV A
	SCALE 1/1	CODE IDENT 23338	SHEET 1 OF 4

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION, OPERATION, AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION.



7 POWER SUPPLY BD. AND CAPACITORS SHOWN REMOVED FROM REAR PANEL.

6. ADD WIRE TIES AS REQUIRED.

△5 ASSEMBLE LARGE CAPACITORS, (ON BRACKET) TRANSFORMER, AND POWER SUPPLY BD. (ASSEMBLED) TO REAR PANEL.

△4 INSTALL AND SOLDER ALL HARNESSES.

△3 MOUNT LARGE CAPACITORS TO MOUNTING BRACKET.

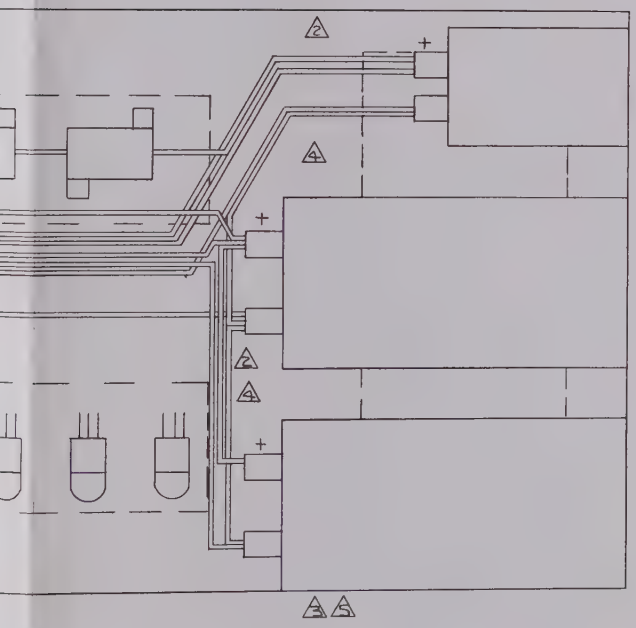
△2 SOLDER TIP'S, 20W RESISTORS, SOLDER LUGS FOR LARGE CAPACITORS AND TRANSISTORS TO WIRE HARNESS.

△1 INSTALL TRANSISTORS, SWITCHES, FUSE AND A.C. RECEPTICAL TO REAR PANEL.

NOTE: UNLESS OTHERWISE SPECIFIED

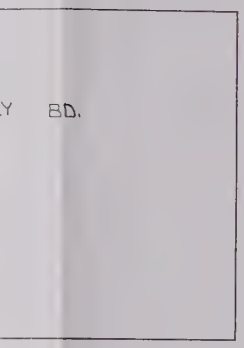
REV	ECN	BY	DATE	APP

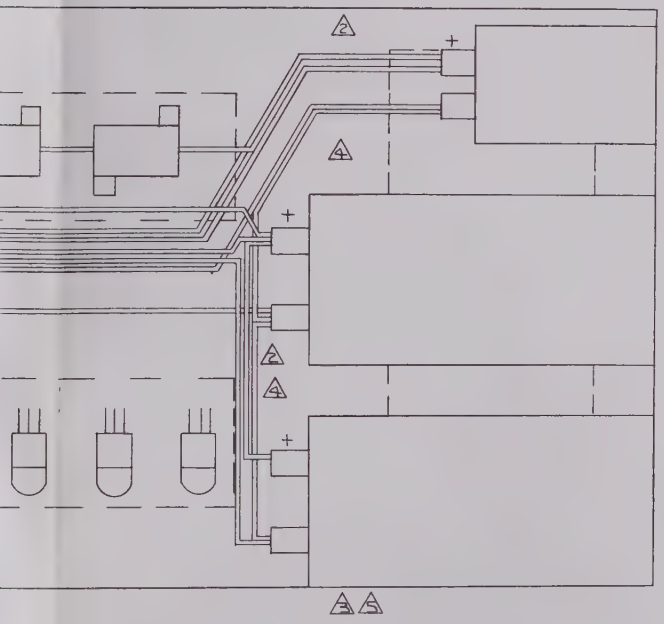
BD.



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3-18-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY POWER SUPPLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1 .XX ±.030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO. D152-046 REV A
	SCALE	CODE IDENT 23338	SHEET 3 OF 4

REV	ECN	BY	DATE	APP





REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3-18-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY POWER SUPPLY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG		MODEL NO 152 / DWG NO D152-046 / REV A
	SCALE		CODE IDENT 23338 / SHEET 3 OF 4

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION, OPERATION, AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION.

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG=
NONE	TRANSFORMER	152=9
NOE	NAMEPLATE	147=3
NONE	STANDOFF	201=3
NONE	REAR PANEL	152=3
NONE	PLATE,CONN MTG	152=3
NONE	BRACKET,CAPACITOR	152=3
NONE	HEATSINK,TRANSISTOR	152=3
NONE	HEATSINK REF:3200=06=0002	152=3
NONE	COVER,CONN,PLATE	1400=
NONE	CAP,ELEC,18000MF,25V	91C25
NONE	CAP,ELECT,600MF,10V	91C1(
NONE	BNC CONN	KC=7(
NONE	CONN,9PIN	03=0(
NONE	CONN,15PIN	03=0(
NONE	RECEPT,POWER	EAC=
NONE	TERM,LOCK LUG	1414(
NONE	TERM,LOCK LUG	1414(

WAVETEK PARTS LIST	TITLE REAR PANEL

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

	MFGR	WAVETEK NO.	QTY/PT
	WVTK	1204-00-0025	1
	WVTK	1400-00-3620	1
	WVTK	1400-00-4173	4
	WVTK	1400-00-8590	1
	WVTK	1400-00-8603	1
	WVTK	1400-00-8613	1
	WVTK	1400-00-8623	1
	WVTK	1400-00-8633	1
	WVTK	1400-00-9192	1
	STM	1500-31-8302	2
	STM	1500-36-0201	1
	KING	2100-01-0002	5
	MOLEX	2100-02-0010	1
	MOLEX	2100-02-0012	1
	SWCFT	2100-03-0005	1
	SMITH	2100-04-0008	1
	SMITH	2100-04-0010	1

0. 669	REV A

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	SOLDER LUG	1497	SMITH	2100-04-0012	5
NONE	LUG # 8	35	ILSCO	2100-04-0018	6
NONE	PIN,FEMALE	02-06-1103	MOLEX	2100-05-0002	4
NONE	PIN,FEMALE	02-09-1118	MOLEX	2100-05-0026	13
NONE	FUSE HOLD	345001	LITFU	2400-05-0012	1
NONE	FUSE,250V,1.5A,FB	31201.5	LITFU	2400-05-0019	1
NONE	TY-WRAP	TYB-23M	TB	2800-00-0006	20
NONE	CABLE CLAMP	835	SMITH	2800-00-0010	1
NONE	RETAINER,SPRING	D-191	WEKSR	2800-09-0007	1
NONE	INSERT # 6	74-11-106-13	SOTCO	2800-09-0017	14
NONE	CAP,MTG,BKT	FJMR	STM	2800-12-0006	2
NONE	CAP,MTG,BKT	FHMR-2	STM	2800-12-0007	1
NONE	WASHER,SHOULDER	2668	SMITH	2800-27-0004	10
NONE	RES,MF,1/4W,1%,10	RN60D-10R0F	TRW	4701-13-1009	1
NONE	RES,WW,25W,1%,.1 OHM	RE70GR100-.1 OHM,1%	DALE	4702-93-0019	2
NONE	DIODE	1N1199A	MOT	4806-01-1199	2
NONE	TRANS	TIP-33	TI	4902-00-0330	2

WAVETEK PARTS LIST	TITLE REAR PANEL	ASSEMBLY NO. 1101-00-0669 PAGE: 2	REV A

DSP4U BUSINESS FORMS PRINTING, INC. 2187

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	TRANS	TIP-34	TI	4902-00-0340	1
NONE	TRANS	TIP-35	TI	4902-00-0350	1
NONE	SW ASSY SLIDE HI-LO	SW422-FT-HK	UID	5105-00-0001	1
NONE	SWITCH ASSY SLIDE	46256-LF	SWCFT	5105-00-0002	1
NONE	SOLDER GUARD	46256-LF-SG	SWCFT	5105-09-0001	2
NONE	VOLTAGE REGULATOR	7805393	FAIR	8000-78-0500	1

WAVETEK PARTS LIST	TITLE REAR PANEL	ASSEMBLY NO. 1101-00-0669 PAGE: 3	REV A

DSP4U BUSINESS FORMS PRINTING, INC. 2187

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE PWR SUPPLY ASSY
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG		MODEL NO. 152 / DWG NO. 1101-00-0669 / REV A
	SCALE		CODE IDENT 23338 / SHEET 1 OF 1

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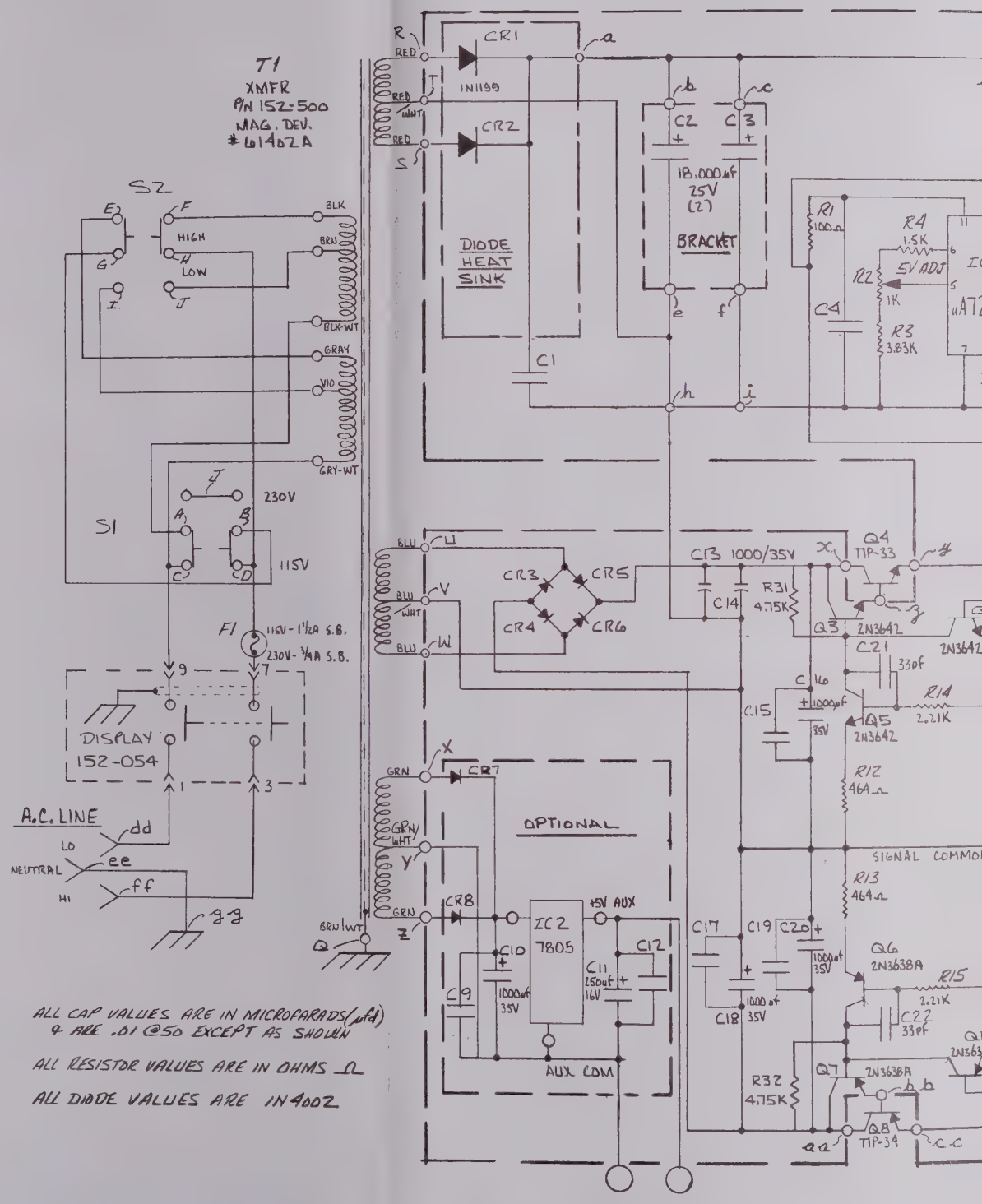
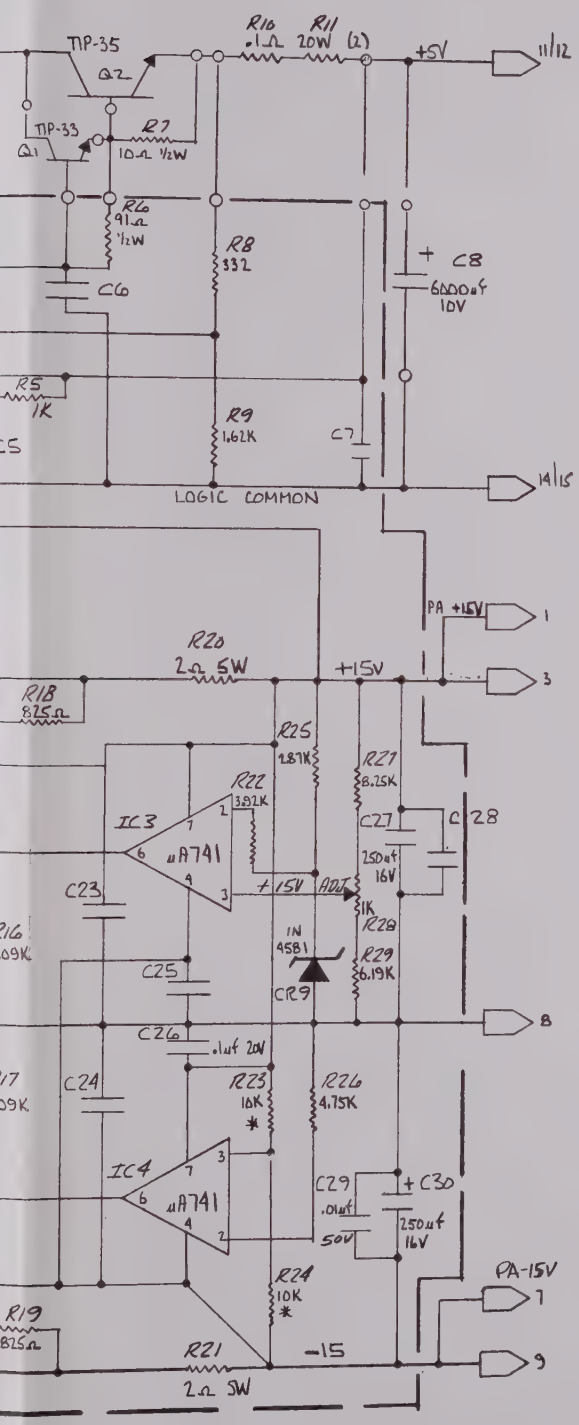


3. ALL CAP VALUES ARE IN MICROFARADS(μfd) & ARE .01 @50 EXCEPT AS SHOWN

2. ALL RESISTOR VALUES ARE IN OHMS Ω

1. ALL DIODE VALUES ARE IN4002

NOTE UNLESS OTHERWISE SPECIFIED



REV	ECN	BY	DATE	APP

LAST REF DESIG USED

CAP	C30
DIODES	CR9
RES	R29
TRAN	Q10
INT CKT	IC4

152-231

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE
MATERIAL	PROJ ENGR	
	RELEASE APPROV	
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030	
	DO NOT SCALE DWG	
	SCALE	

WAVETEK SAN DIEGO • CALIFORNIA

TITLE: SCHEMATIC DIAGRAM POWER SUPPLY

MODEL NO.	DWG NO.	REV
152	D152-236	
CODE IDENT 23338	SHEET 1 OF 1	

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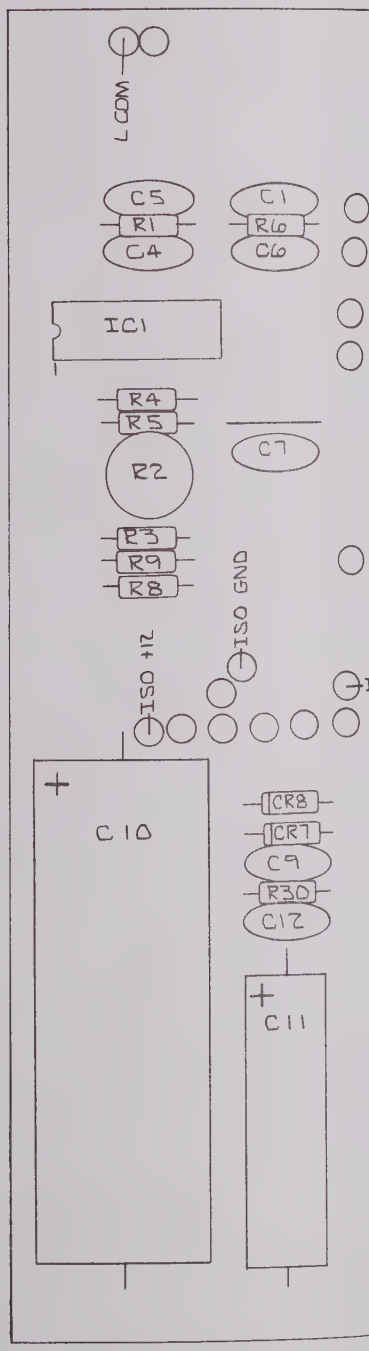
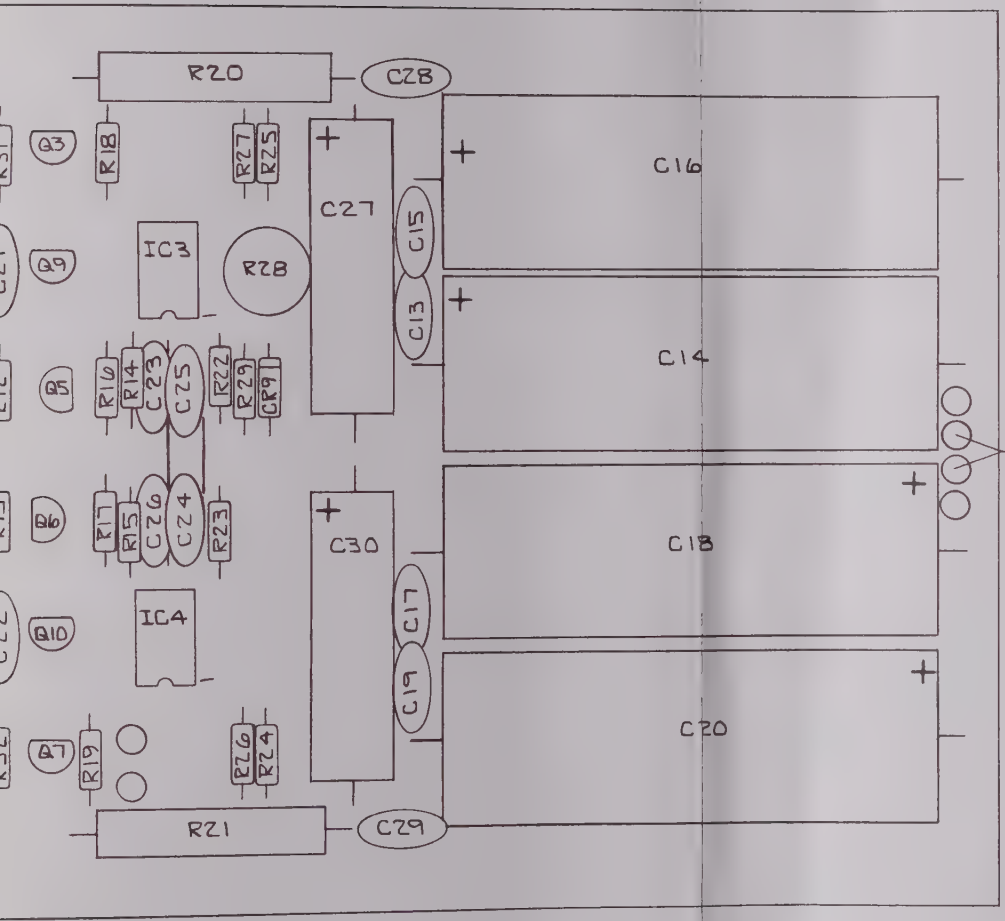


1. TERMINALS SHOULD BE USED FOR +15V & -15V CONNECTIONS

NOTE: UNLESS OTHERWISE SPECIFIED

A	ADDED +VE-V SIGNS NOTE #1.	BA	9-16-75	



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3675	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY POWER SUPPLY BD.
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO. 152	DWG NO. C152-036 REV A1
	SCALE	CODE IDENT 23338	SHEET 1 OF

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION, OPERATION, AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION.

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP,CER,.01MF,50V	CK-103 LONG LEAD	CRL	1500-01-0300	6
NONE	CAP,CER,.1MF,20V	UK20-104	ARCO	1500-01-0413	11
NONE	CAP,CER,33PF,1KV	OD-330	CRL	1500-03-3011	2
NONE	CAP,ELECT,1000MF,35V	39D108G035GL6	SPRAG	1500-31-0212	5
NONE	CAP,ELECT,250MF,16V	500D257G016DF7	SPRAG	1500-32-5101	3
NONE	POWER SUPPLY	152-136	WVTK	1700-00-0153	1
NONE	TERM	1309D1	USECO	2100-05-0027	2
NONE	POT,TRIM,1K	91AR1K	BECK	4600-01-0209	2
NONE	RES,MF,1/8W,1%,100	RN55D-1000F	TRW	4701-03-1000	1
NONE	RES,MF,1/8W,1%,1K	RN55D-1001F	TRW	4701-03-1001	1
NONE	RES,MF,1/8W,1%,10K	RN55D-1002F	TRW	4701-03-1002	2
NONE	RES,MF,1/8W,1%,1.5K	RN55D-1501F	TRW	4701-03-1501	1
NONE	RES,MF,1/8W,1%,1.62K	RN55D-1621F	TRW	4701-03-1621	1
NONE	RES,MF,1/8W,1%,2.21K	RN55D-2211F	TRW	4701-03-2211	2
NONE	RES,MF,1/8W,1%,2.87K	RN55D-2871F	TRW	4701-03-2871	1
NONE	RES,MF,1/8W,1%,332	RN55D-3320F	TRW	4701-03-3320	1
NONE	RES,MF,1/8W,1%,3.83K	RN55D-3831F	TRW	4701-03-3831	1
NONE	RES,MF,1/8W,1%,3.92K	RN55D-3921F	TRW	4701-03-3921	1

WAVETEK PARTS LIST	TITLE PCA POWER SUPPLY	ASSEMBLY NO. 1100-00-0153 PAGE: 1	REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES,MF,1/8W,1%,464	RN55D-4640F	TRW	4701-03-4640	2
NONE	RES,MF,1/8W,1%,4.75K	RN55D-4751F	TRW	4701-03-4751	3
NONE	RES,MF,1/8,1%,499	RN55D-4990F	TRW	4701-03-4990	1
NONE	RES,MF,1/8W,1%,6.19K	RN55D-6191F	TRW	4701-03-6191	1
NONE	RES,MF,1/8W,1%,825	RN55D-8250F	TRW	4701-03-8250	2
NONE	RES,MF,1/8W,1%,8.25K	RN55D-8251F	TRW	4701-03-8251	1
NONE	RES,MF,1/8W,1%,9.09K	RN55D-9091F	TRW	4701-03-9091	2
NONE	RES,MF,1/8W,1%,90.9	RN55D-90R9F	TRW	4701-03-9099	1
NONE	RES,WW,5W,5%,2	243E2R05	SPRAG	4702-65-2009	2
NONE	DIODE	1N4581	MICRO	4801-01-4581	1
NONE	DIODE	SCE-1	SEMTC	4801-02-0001	6
NONE	TRANS	2N3638	FAIR	4901-03-6380	3
NONE	TRANS	2N3642	FAIR	4901-03-6420	3
NONE	IC	723PC	FAIR	7000-07-2300	1
NONE	IC	MA-741	FAIR	7000-07-4100	2

WAVETEK PARTS LIST	TITLE PCA POWER SUPPLY	ASSEMBLY NO. 1100-00-0153 PAGE: 2	REV

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PWR SUPPLY BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		MODEL NO: 152
	DO NOT SCALE DWG		DWG NO: 1100-00-0153
	SCALE		REV
			CODE IDENT: 23338
			SHEET 1 OF 1

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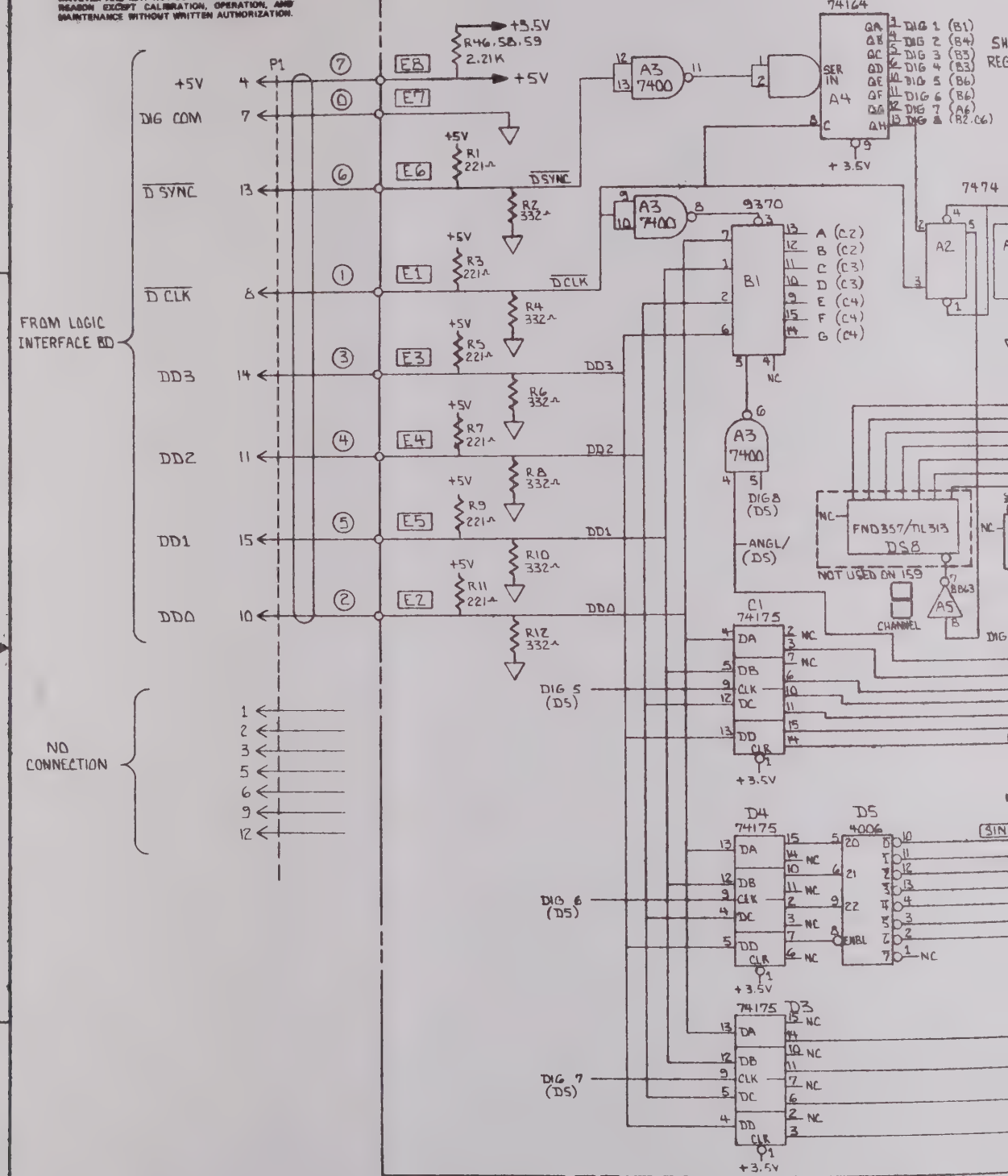
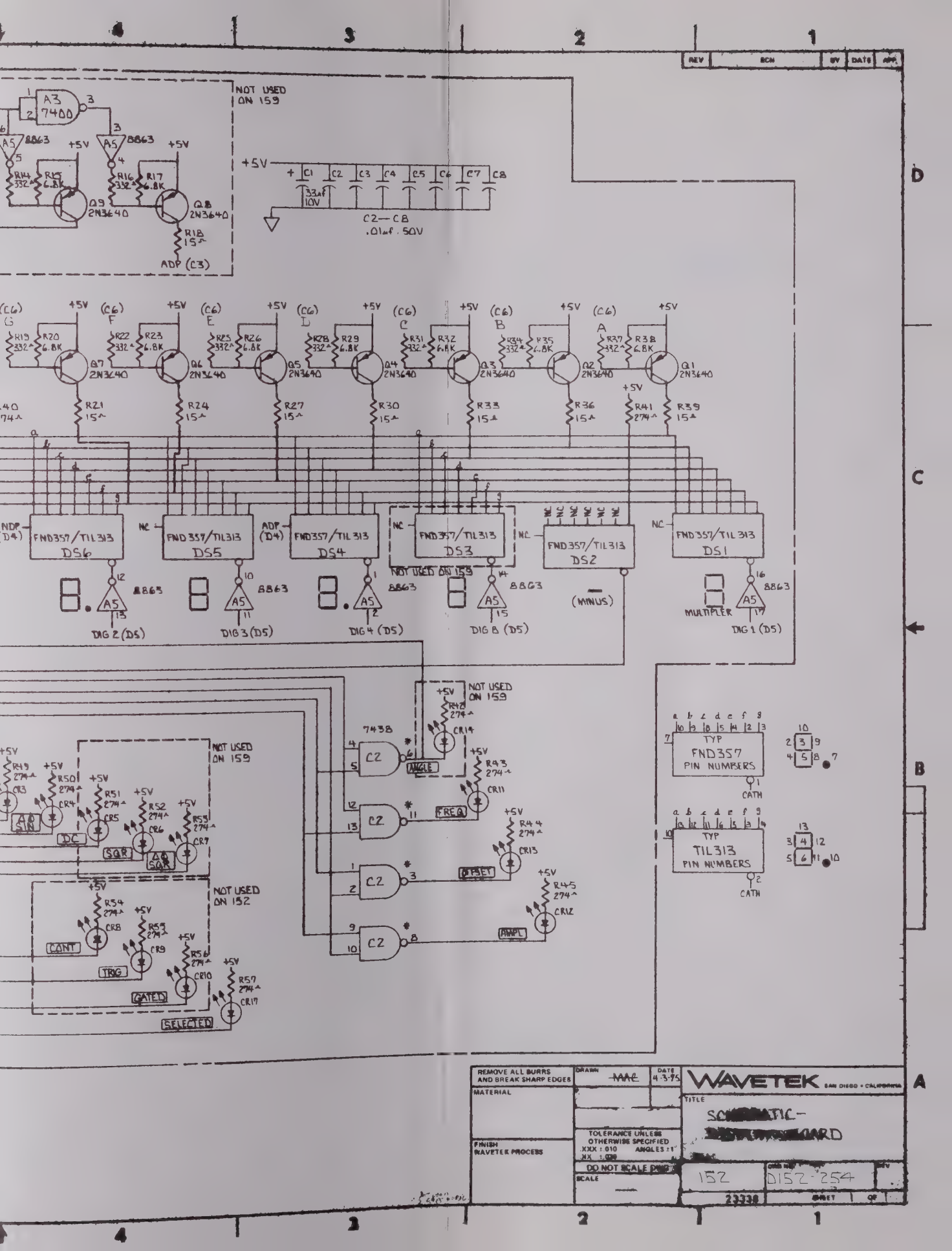
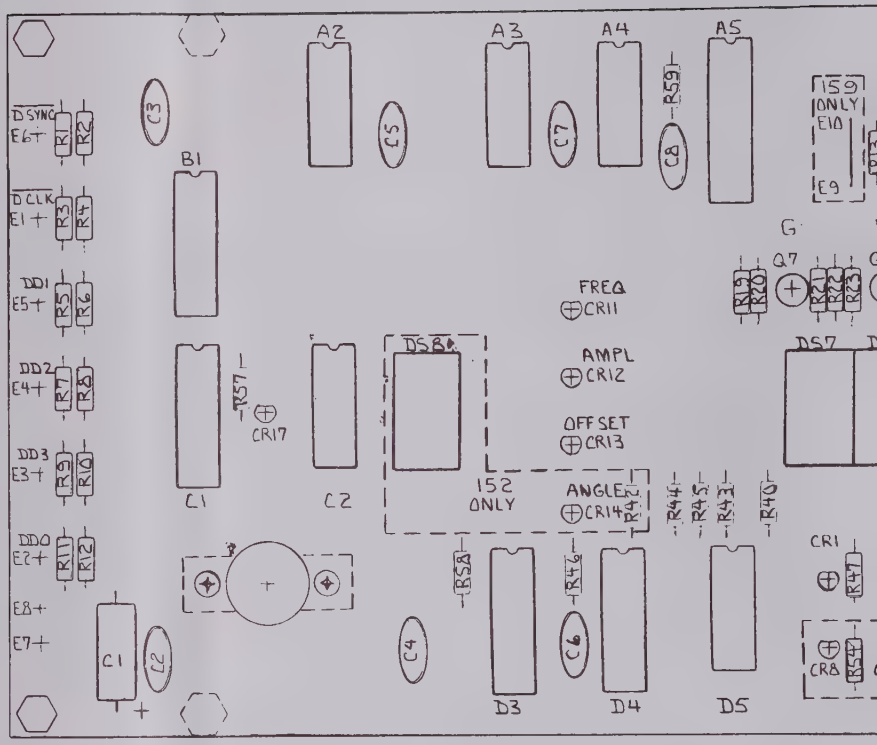


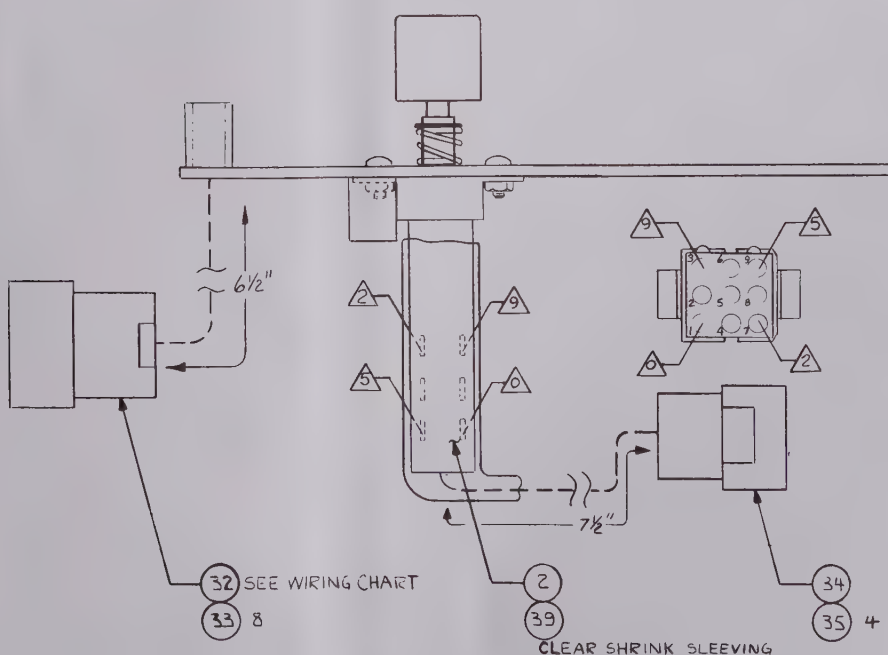
4. ○ DENOTES WIRE COLOR PER COLOR CODE.
3. ▭ DENOTES LABELING ON BOARD OR DISPLAY PANEL.
2. ALL RESISTORS ARE ±1%, 1/8W.
⚠ ADD JUMPER WHEN LOADING FOR MODEL 159.

NOTE: UNLESS OTHERWISE SPECIFIED

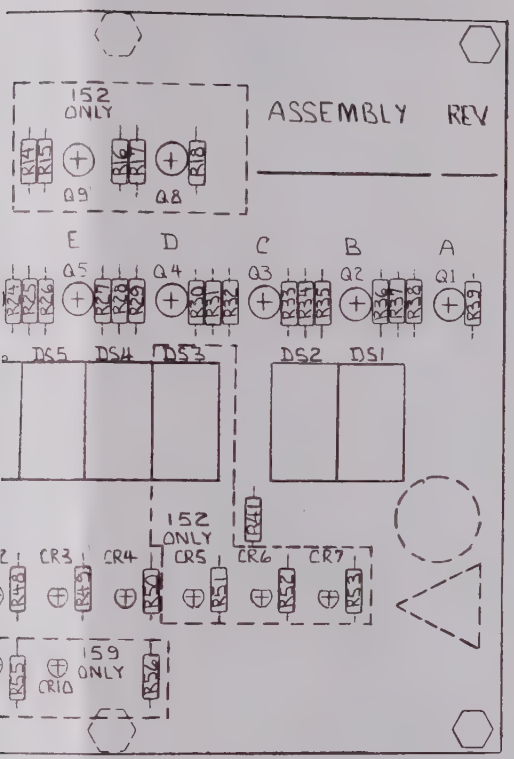

NOT USED ON 159
A3 7400
A5 8863
+5V
R14 332Ω
R15 6.8K
R16 332Ω
R17 6.8K
Q9 2N3640
Q8 2N3640
R18 15Ω
ADP (C3)
C1 C2 C3 C4 C5 C6 C7 C8
33uf 10V
C2—C8 .01uf 50V
R19 R20 R22 R23 R25 R26 R28 R29 R31 R32 R34 R35 R37 R38
Q7 2N3640
Q6 2N3640
Q5 2N3640
Q4 2N3640
Q3 2N3640
Q2 2N3640
Q1 2N3640
R21 15Ω
R24 15Ω
R27 15Ω
R30 15Ω
R33 15Ω
R36 15Ω
R41 274Ω
R39 15Ω
FND357/TIL313 DS6
FND357/TIL313 DS5
FND357/TIL313 DS4
FND357/TIL313 DS3
FND357/TIL313 DS2
FND357/TIL313 DS1
NOT USED ON 159
(MINUS)
MULTIPLER
DIG 2 (DS)
DIG 3 (DS)
DIG 4 (DS)
DIG 8 (DS)
DIG 1 (DS)
7438
C2
ANGLE
FREQ
OFFSET
AMPL
R42 274Ω
R43 274Ω
R44 274Ω
R45 274Ω
CR14
CR11
CR13
CR12
R49 R50 R51 R52 R53 274Ω
CR3 CR4 CR5 CR6 CR7
AC SIN
DC
SQR
AC SQR
R54 R55 R56 R57 274Ω
CR8 CR9 CR10 CR17
CONT
TRIG
GATED
SELECTED
TYP FND357 PIN NUMBERS
CATH
TYP TIL313 PIN NUMBERS
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN MAE
DATE 4-3-75
TOLERANCE UNLESS OTHERWISE SPECIFIED
XXX ± .010 ANGLES ± 1°
XX ± .030
DO NOT SCALE PRINT
SCALE
WAVETEK SAN DIEGO • CALIFORNIA
TITLE SCHEMATIC - [redacted] BOARD
152
D152-254
23338
SHEET OF

WIRING CHART		
BOARD LOCATION	CODED WIRE COLOR	CONNECTOR PIN NUMBER
E1	1	8
E2	2	10
E3	3	14
E4	4	11
E5	5	15
E6	6	13
E7	0	7
E8	7	4

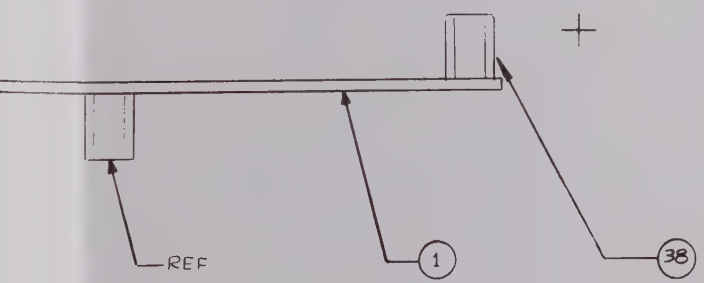




NOTES: 1. △ DENOTES WIRE COLOR PER COLOR CODE.



158-152 DISPLAY BOARD SILKSCREEN MASTER



	DRAWN HHAC	DATE 5.9.75	WAVETEK
MATERIAL SEE PARTS LIST	PP		TITLE SILKSCREEN ASSEMBLY DWG - DISPLAY BOARD
	RELEASE APPROVAL		
	SCALE 2/1	MODEL NO. 152	DWG NO. D152-054 REV
		CODE IDENT 23338	SHEET 1

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NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP,CER,.01MF,50V	CK-103	CRL	1500-01-0310	7
NONE	CAP,TANT,33MF,10V	150D336X901082	SPRAG	1500-73-3601	1
NONE	DISPLAY	158-151	WVTK	1700-00-0105	1
NONE	PLUG,9PIN	03-06-2091	MOLEX	2100-02-0011	1
NONE	PLUG,15PIN	03-09-2151	MOLEX	2100-02-0013	1
NONE	PIN,MALE	02-06-2103	MOLEX	2100-05-0003	4
NONE	PIN,MALE	02-09-2118	MOLEX	2100-05-0005	8
NONE	STANDOFF	6910-6-2C	LYNTR	2800-03-0002	8
NONE	RES,MF,1/8W,1%,15	RN55D-15R0F	TRW	4701-03-1509	9
NONE	RES,MF,1/8W,1%,221	RN55D-2210F	TRW	4701-03-2210	6
NONE	RES,MF,1/8W,1%,2.21K	RN55D-2211F	TRW	4701-03-2211	3
NONE	RES,MF,1/8W,1%,274	RN55D-2740F	TRW	4701-03-2740	14
NONE	RES,MF,1/8W,1%,332	RN55D-3320F	TRW	4701-03-3320	15
NONE	RES,MF,1/8W,1%,6.81K	RN55D-6811F	TRW	4701-03-6811	9
NONE	LED	TIL-209A	TI	4899-00-0005	12
NONE	LED	5082-7740-C	HP	4899-00-0009	8
NONE	TRANS	2N3640	FAIR	4901-03-6400	9
NONE	SWITCH ASSY PB	157-422	WVTK	5103-00-0011	1

WAVETEK PARTS LIST	TITLE DISPLAY	ASSEMBLY NO. 1100-00-0149 PAGE: 1	REV

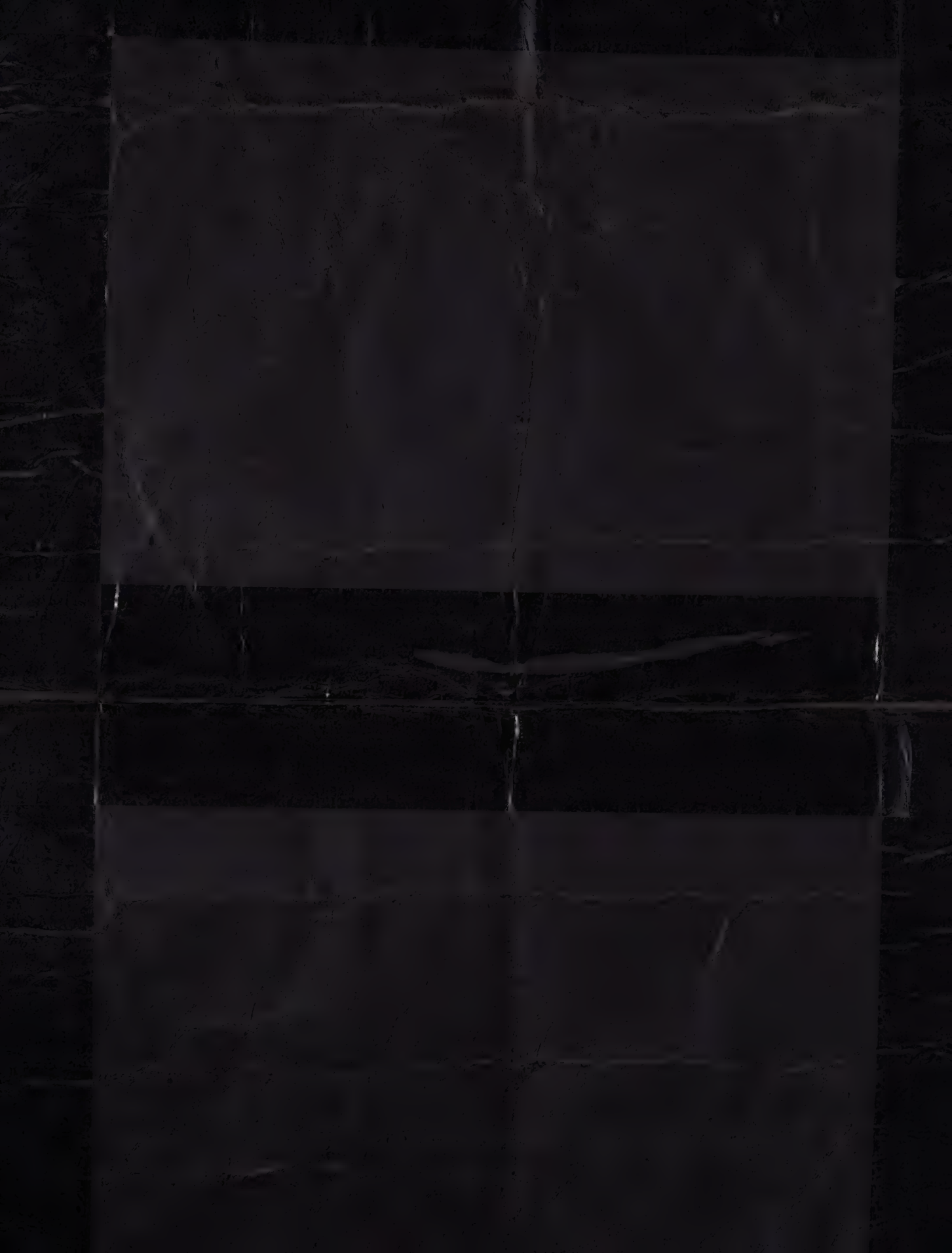
DESIGN BUSINESS FORMS PRINTING, INC. 2187

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	BUTTON	8315 BLACK	CRL	5103-04-0001	1
NONE	IC	4006	MOT	8000-40-0600	1
NONE	IC	7400	TI	8000-74-0000	1
NONE	IC	7438	TI	8000-74-3800	1
NONE	IC	7474	TI	8000-74-7400	1
NONE	IC	D88863	NSC	8000-88-6300	1
NONE	IC	9370DC	FAIR	8000-93-7000	1
NONE	IC	74164	TI	8007-41-6400	1
NONE	IC	74175	TI	8007-41-7500	3

WAVETEK PARTS LIST	TITLE DISPLAY	ASSEMBLY NO. 1100-00-0149 PAGE: 2	REV

DESIGN BUSINESS FORMS PRINTING, INC. 2187

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: DISPLAY BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		MODEL NO: 152
	DO NOT SCALE DWG		DWG NO: 1100-00-0149 REV
	SCALE		CODE IDENT: 23338 SHEET 1 OF 1



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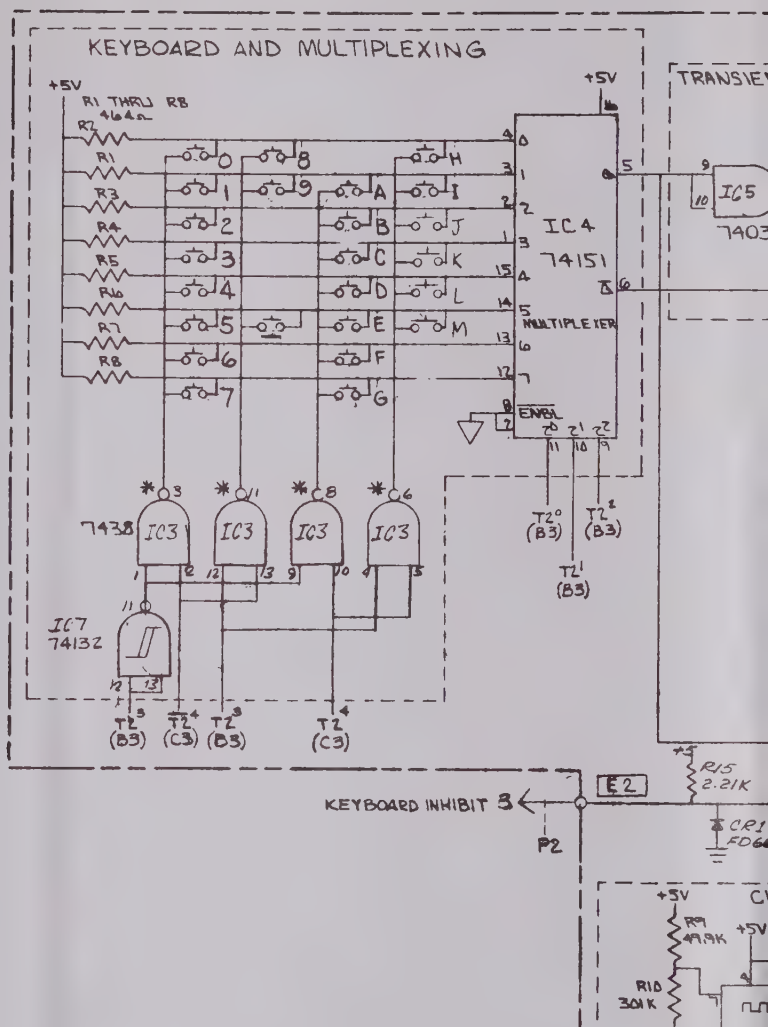
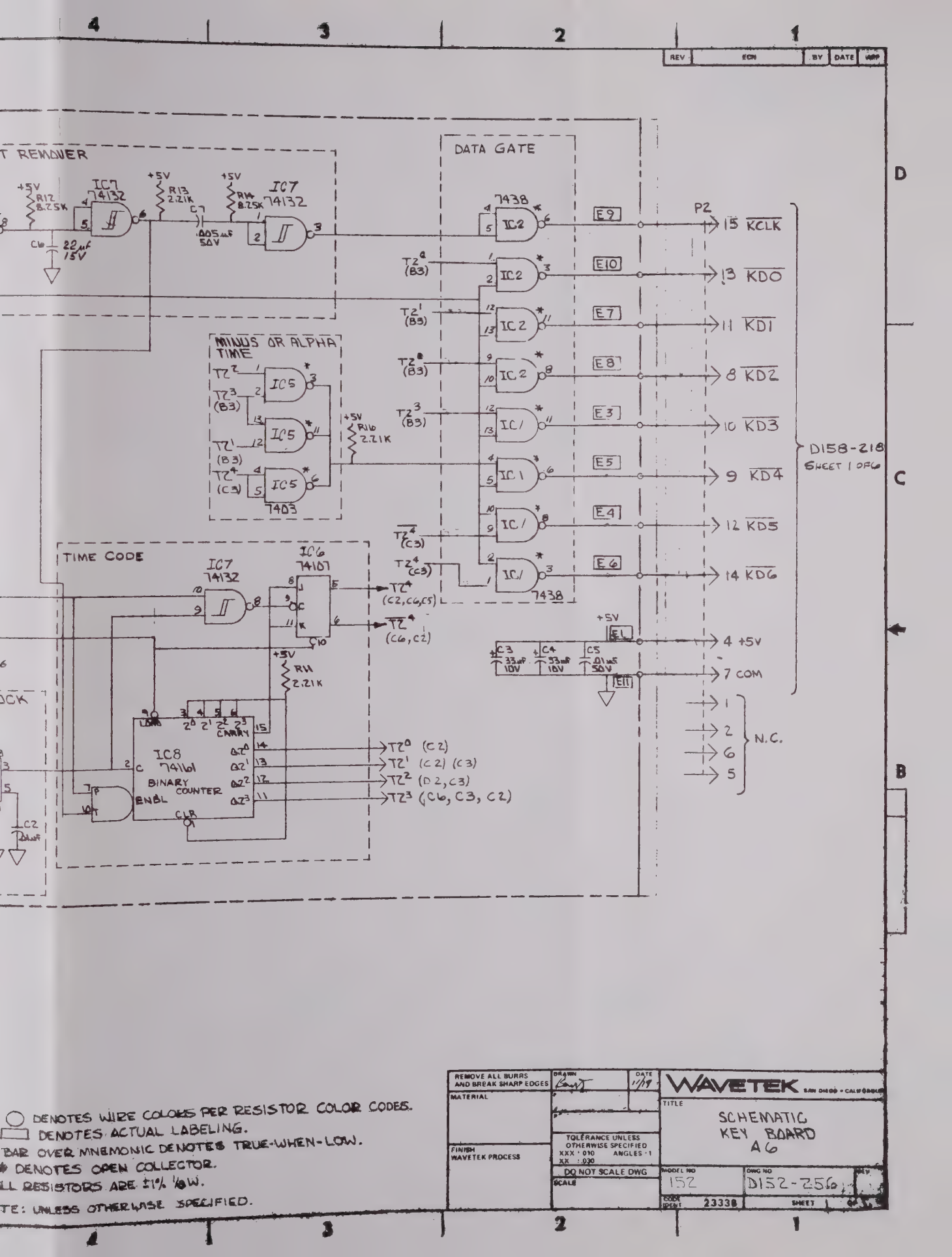
KEYBOARD ARRANGEMENT

7	8	9	A	G
4	5	6	D	B
1	2	3	C	F
-	0	E	H	I

A = FREQ
B = FUNC
C = OFST
D = AMPL
E = MULT
F = CHNL
G = UNIT
H = EXEC
I = ANGL
- = —





○ DENOTES WIRE COLORS PER RESISTOR COLOR CODES.
▭ DENOTES ACTUAL LABELING.
BAR OVER MNEMONIC DENOTES TRUE-WHEN-LOW.
# DENOTES OPEN COLLECTOR.
LL RESISTORS ARE ±1% ⅛W.
TE: UNLESS OTHERWISE SPECIFIED.

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE 11/19	WAVETEK SAN DIEGO, CALIFORNIA
MATERIAL			TITLE: SCHEMATIC KEY BOARD A6
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ± 1 XX ± .030		
	DO NOT SCALE DWG	SCALE	MODEL NO 152
			DWG NO D152-2566 REV
			CODE IDENT 23338 SHEET 1 OF 1

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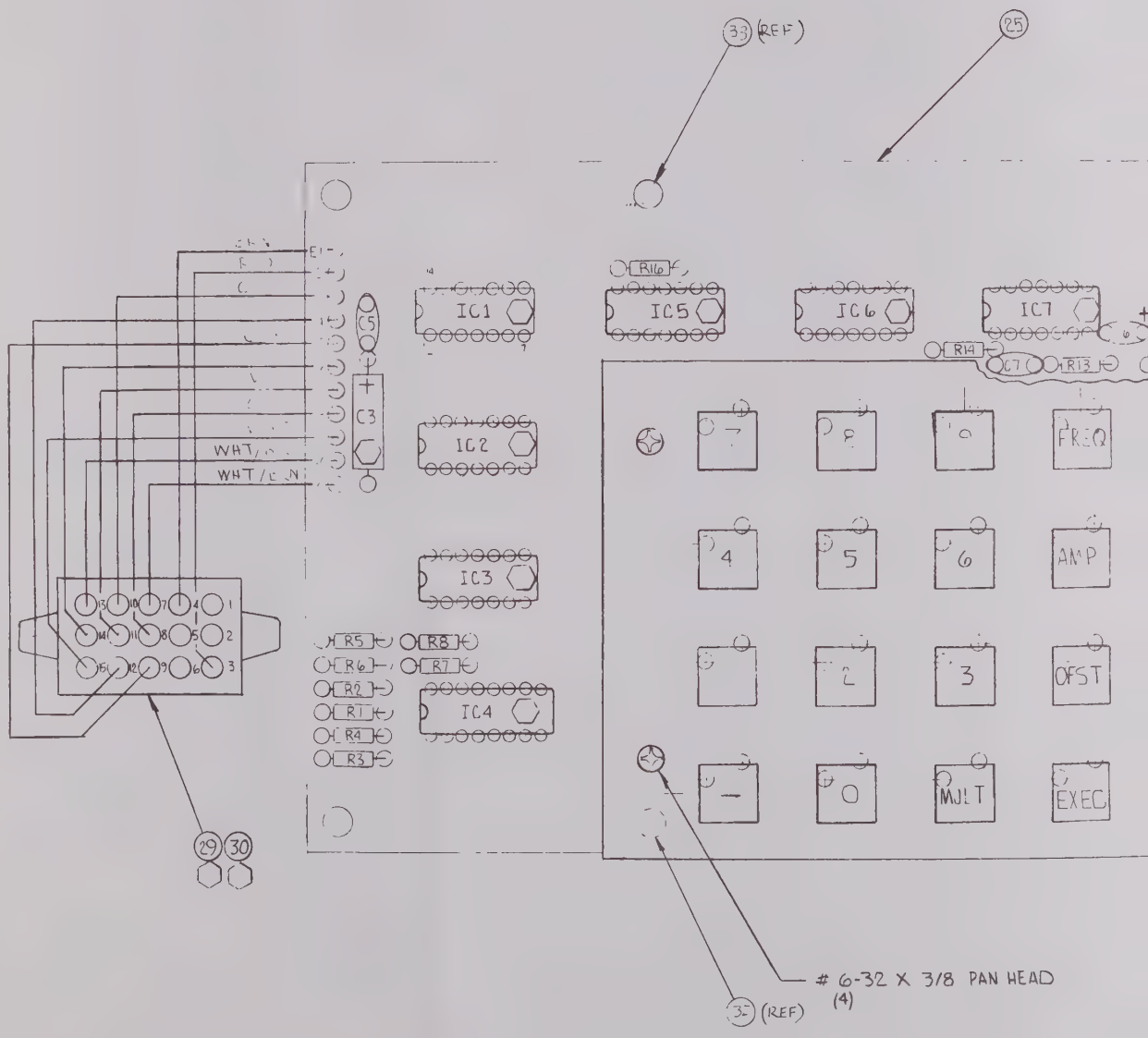
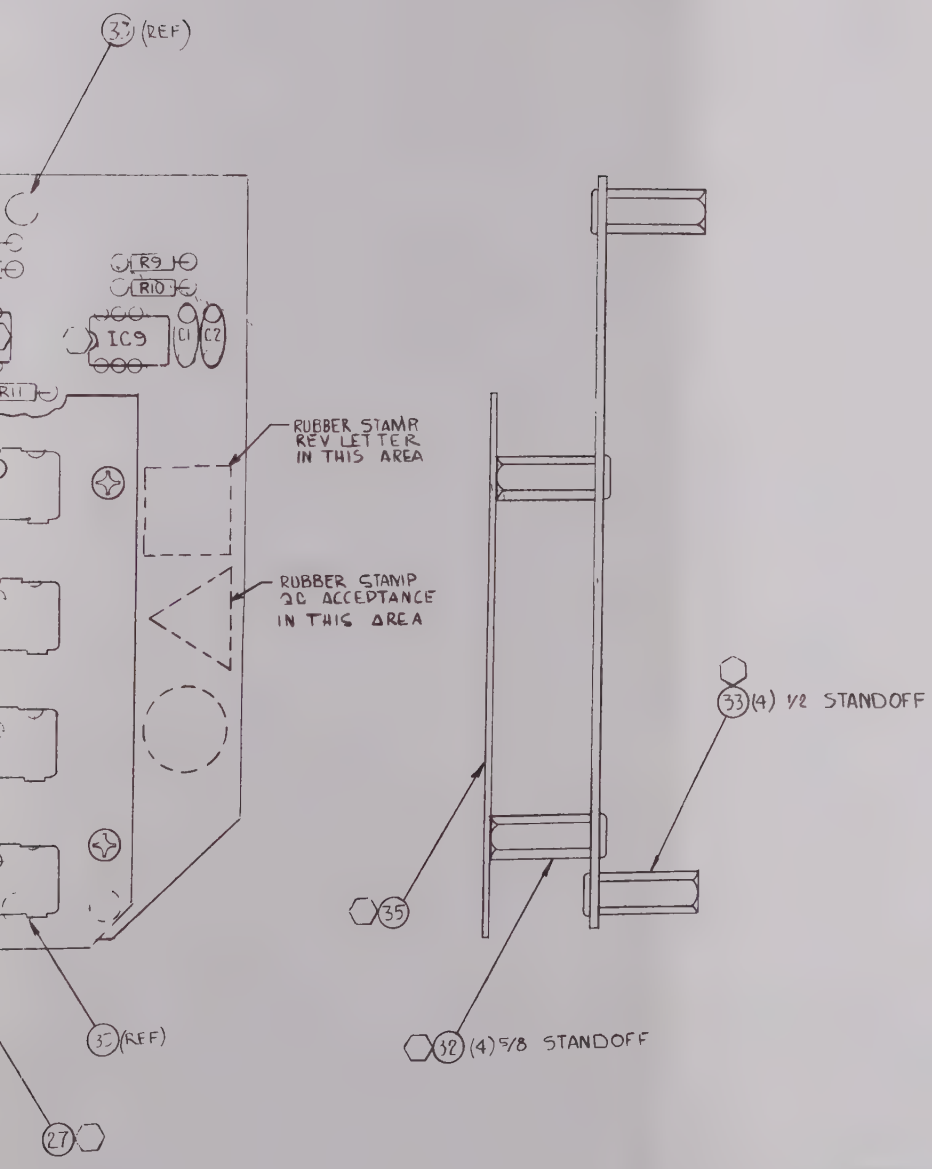


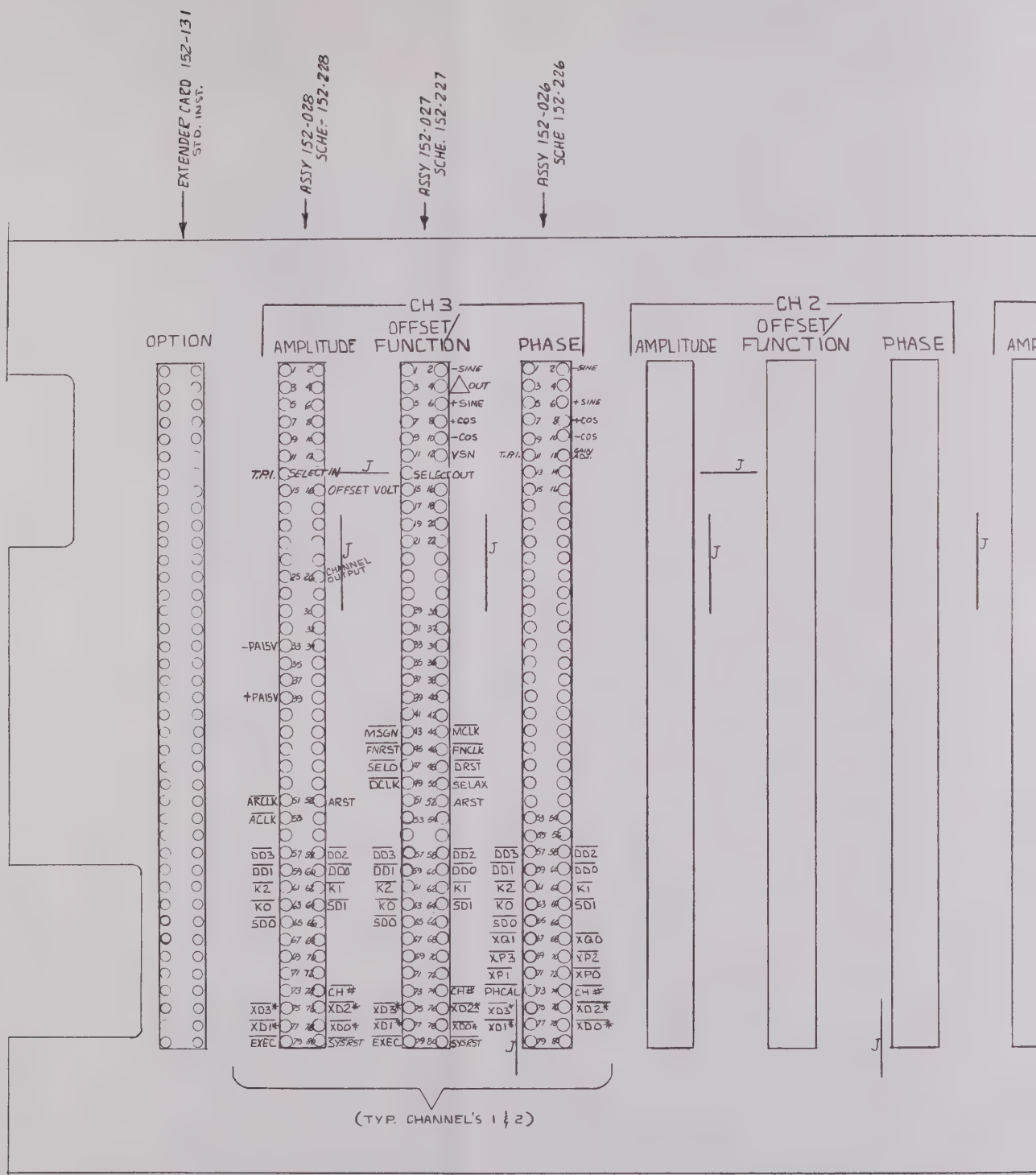
(6)
(4) NUMBERS IN HEX AND CIRCLES INDICATE STATION LOCATION.

NOTE UNLESS OTHERWISE SPECIFIED



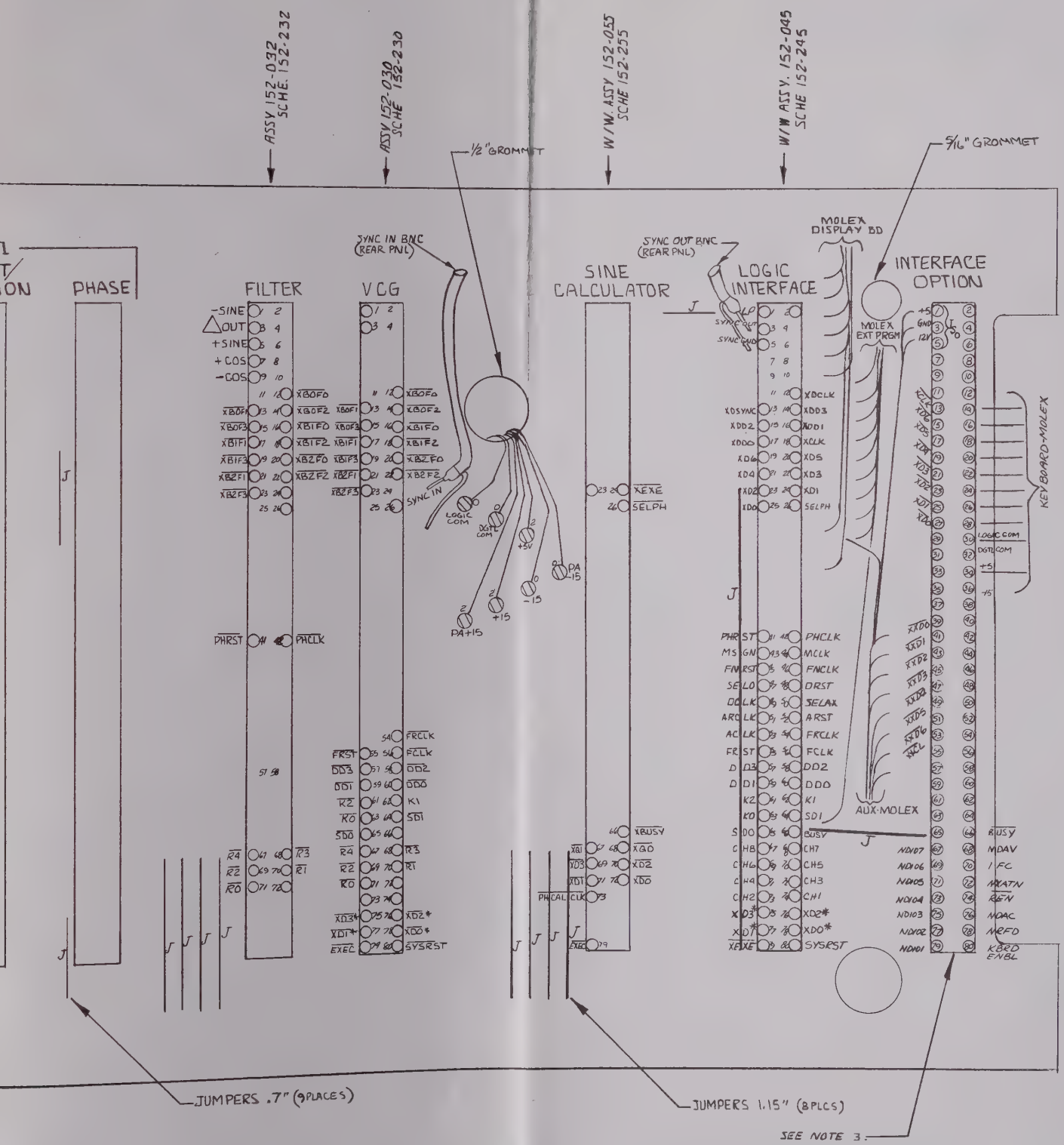
REV	ECN	BY	DATE	APP'D

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN D. BARNETT	DATE 12/11/74	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	RELEASE		TITLE PC ASSY - KEYBOARD
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX .010 ANGLES ·1 XX .030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO D152-056 REV
	SCALE 2/1	CODE IDENT 23338	SHEET 1 OF 1



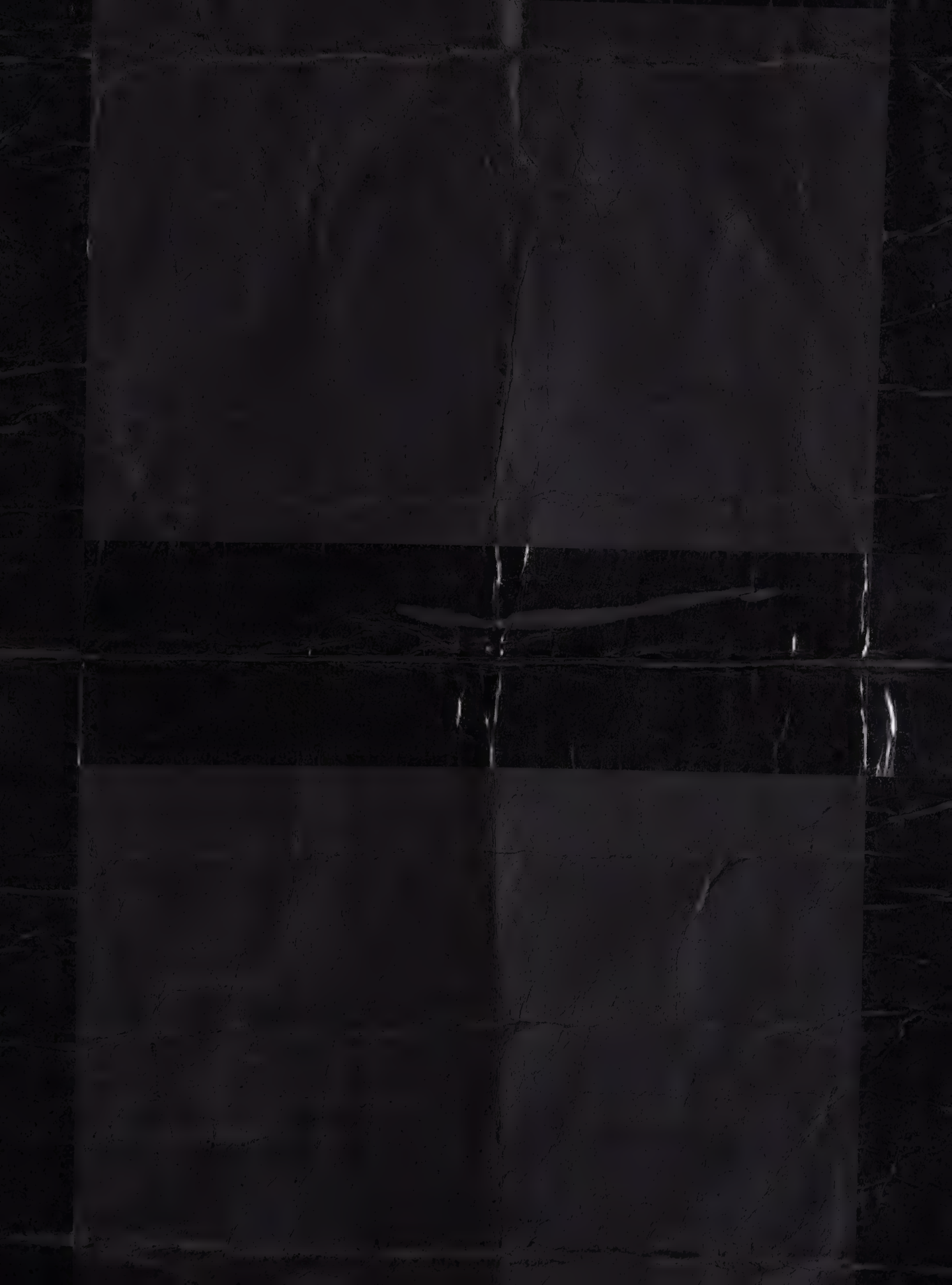
4. ROUTE ALL CABELING TO BRD EDGE, UNDER CONN. MTG HOLES.
3. ASSY IEC, I50, TTY/RS232 OPTION BD, NOT INSTALLED ON STD. MACH.
2. CONN.'S ARE CINCH JONES, 80 PIN CARD CONN., # HW4080. (15 PLCS)

NOTES: 1. ASSY. CALLOUTS FOR REF. ONLY.



COMPONENT SIDE

WAVETEK
ASSY. MOTHER BD
MODEL 152 STANDARD
D152-034A
1 of 2
Rev 3-16-76



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NOTE. UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	BLOCK,CABLE MTG	152-328	WVTK	1400-00-R640	5
NONE	MOTHER BOARD	152-134	WVTK	1700-00-0670	1
NONE	CONN,15PIN	03-09-1151	MOLEX	2100-02-0012	4
NONE	PLUG,15PIN	03-09-2151	MOLEX	2100-02-0013	1
NONE	CONN	57-20240	AMPH	2100-02-0060	1
NONE	CONN,EDGE,80 PIN	2HW4000-111	WINCH	2100-03-0054	15
NONE	PIN,MALE	02-09-2118	MOLEX	2100-05-0005	15
NONE	PIN,FEMALE	02-09-1118	MOLEX	2100-05-0026	60
NONE	TERM	130981	USECO	2100-05-0046	10
NONE	CABLE CLAMP	835	SMITH	2800-00-0010	3
NONE	CLAMP,CABLE	837	SMITH	2800-00-0011	2
NONE	RETAINER,SPRING	D-191	WEKSR	2800-09-0007	3
NONE	GROMMET	GB2172/3068	ROYAL	2800-10-0001	1
NONE	GROMMET,RUBBER	2175	SMITH	2800-10-0003	2

WAVETEK PARTS LIST	TITLE	ASSEMBLY NO.	REV
	PCA MOTHER BD	1100-00-0670	C
		PAGE: 1	

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° XX ±.030		MODEL NO. 152 / DWG NO. 1100-00-0670 / REV C
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET 1 OF 1
	SCALE		

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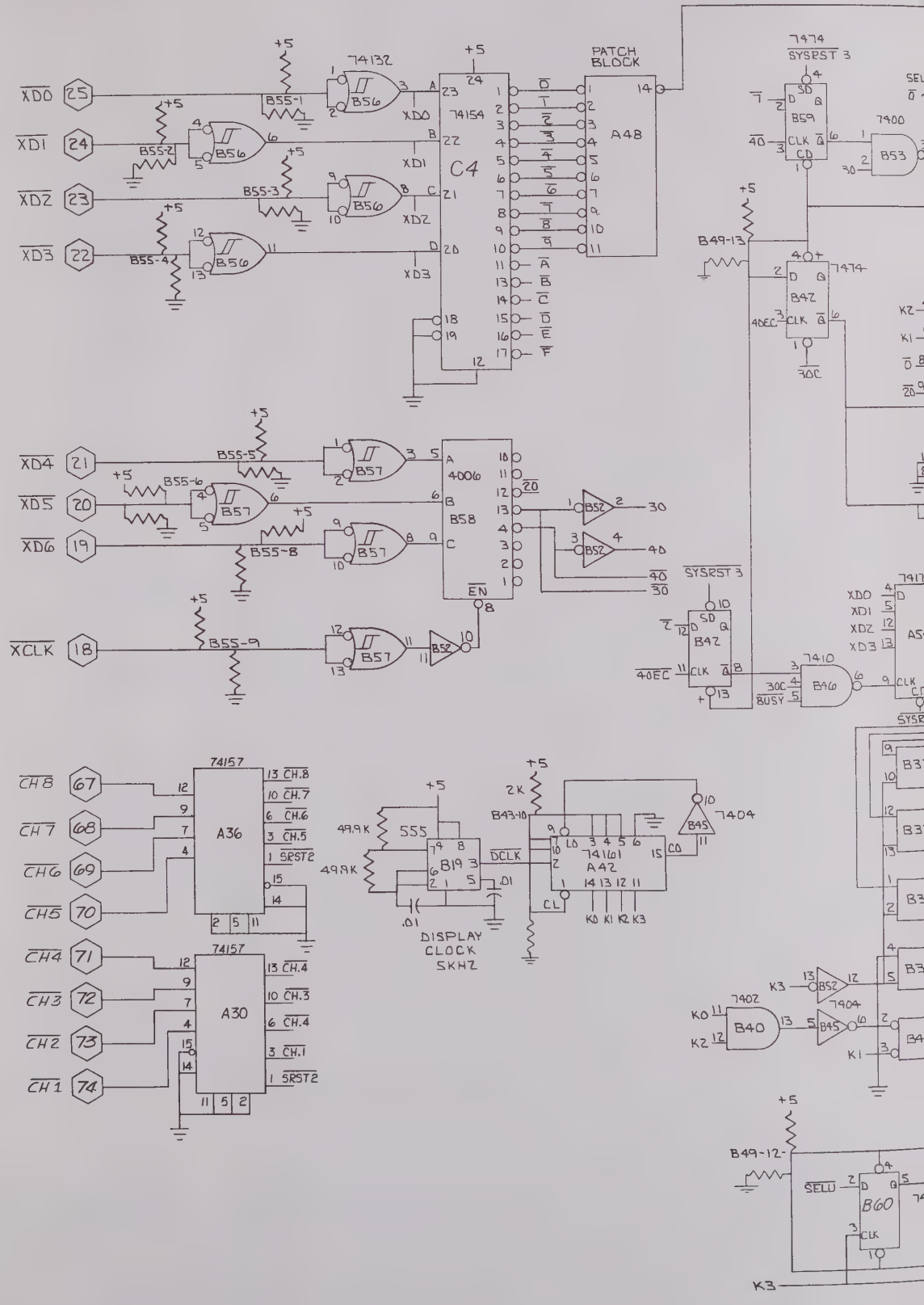
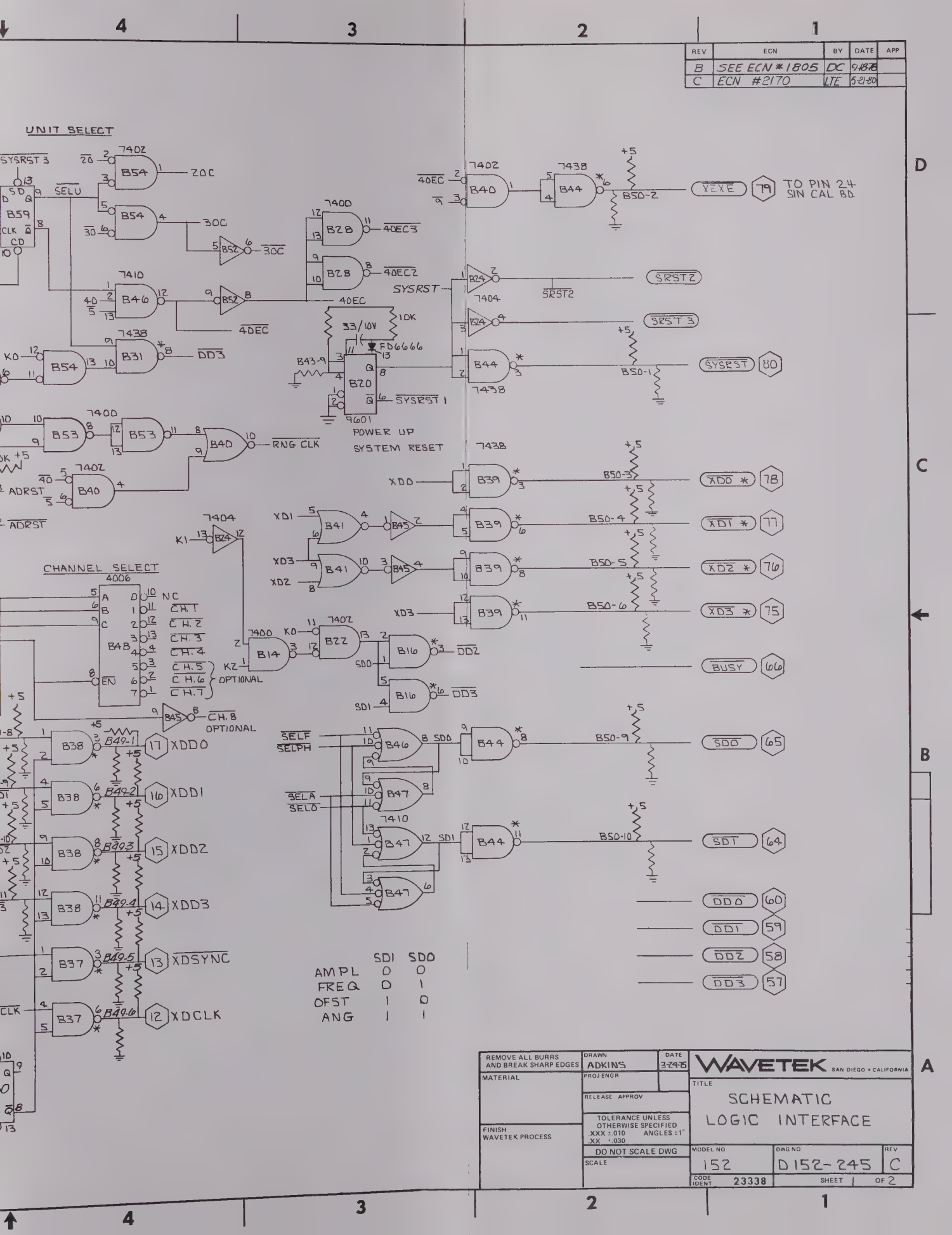
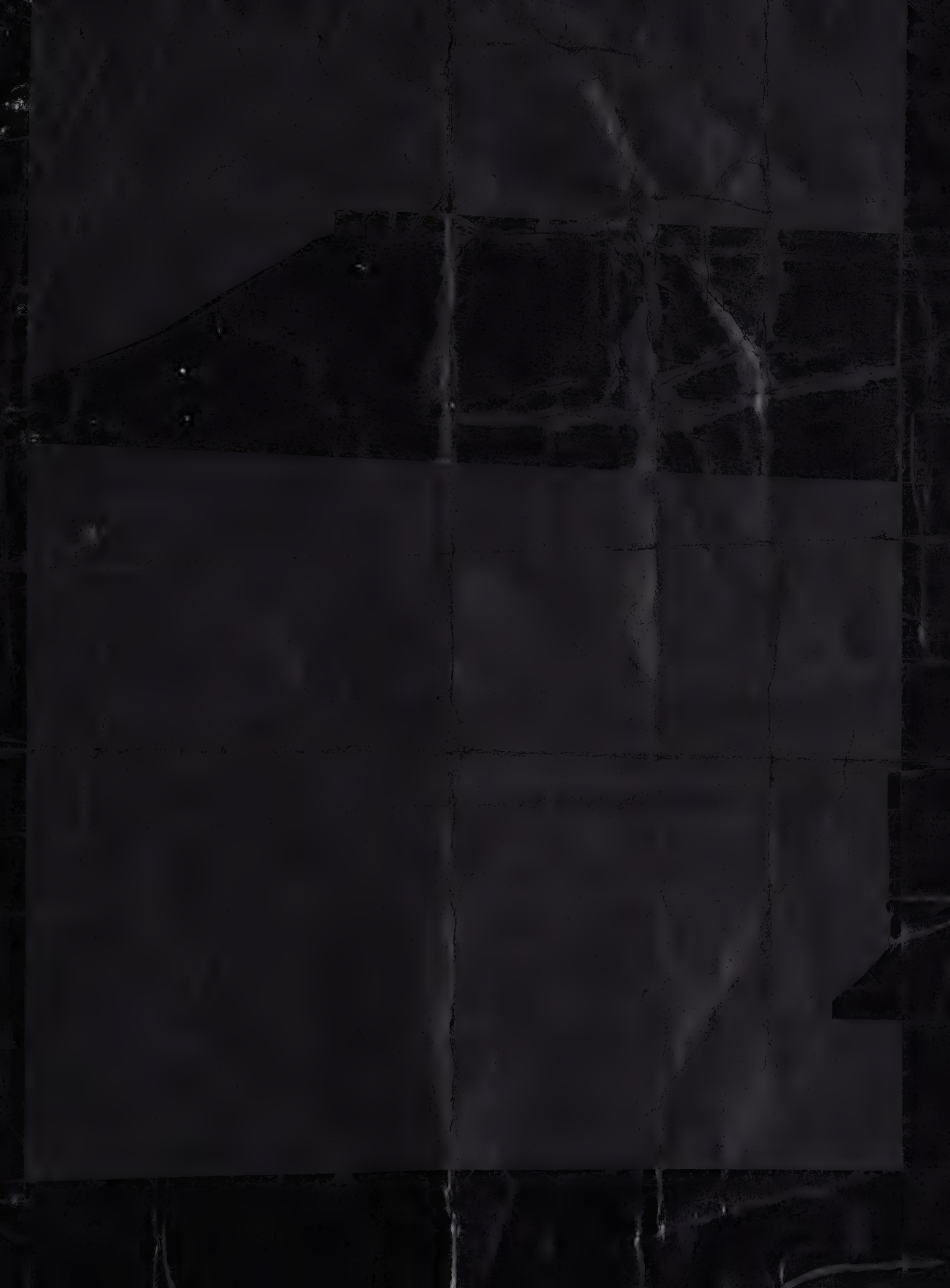


NOTE: UNLESS OTHERWISE SPECIFIED


4
3
2
1
REV | ECN | BY | DATE | APP
B | SEE ECN #1805 | DC | 9-18-78
C | ECN #2170 | LTE | 5-21-80
UNIT SELECT
SYSRST 3
SELU
7402
B54
B59
7410
B46
7438
B31
DD3
7400
B53
B40
RNG CLK
ADRST
CHANNEL SELECT
4006
B48
NC
CH.1
CH.2
CH.3
CH.4
CH.5
CH.6
CH.7
EN
CH.8
OPTIONAL
B45
7404
B14
B22
B16
DD2
DD3
B38
B37
XDD0
XDD1
XDD2
XDD3
XDSYNC
XDCLK
B49-1
B49-2
B49-3
B49-4
B49-5
B49-6
B20
9601
POWER UP
SYSTEM RESET
SYSRST
SYSRST1
SRST2
SRST3
SRST2
SRST3
SYSRST
B50-1
B50-2
B50-3
B50-4
B50-5
B50-6
B50-9
B50-10
B39
B41
B42
B43
B44
B46
B47
XDO
XD1
XD2
XD3
XDO *
XD1 *
XD2 *
XD3 *
BUSY
SDO
SDT
DDO
DDT
DDZ
DD3
SELF
SELPH
SELA
SELO
SDO
SDT
TO PIN 24 SIN CAL BD.
SDI SDO
AMPL 0 0
FREQ 0 1
OFST 1 0
ANG 1 1
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN ADKINS
DATE 3-7-75
PROJ ENGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030
DO NOT SCALE DWG
SCALE
WAVETEK SAN DIEGO • CALIFORNIA
TITLE
SCHEMATIC
LOGIC INTERFACE
MODEL NO 152
DWG NO D152-245
REV C
CODE IDENT 23338
SHEET 1 OF 2



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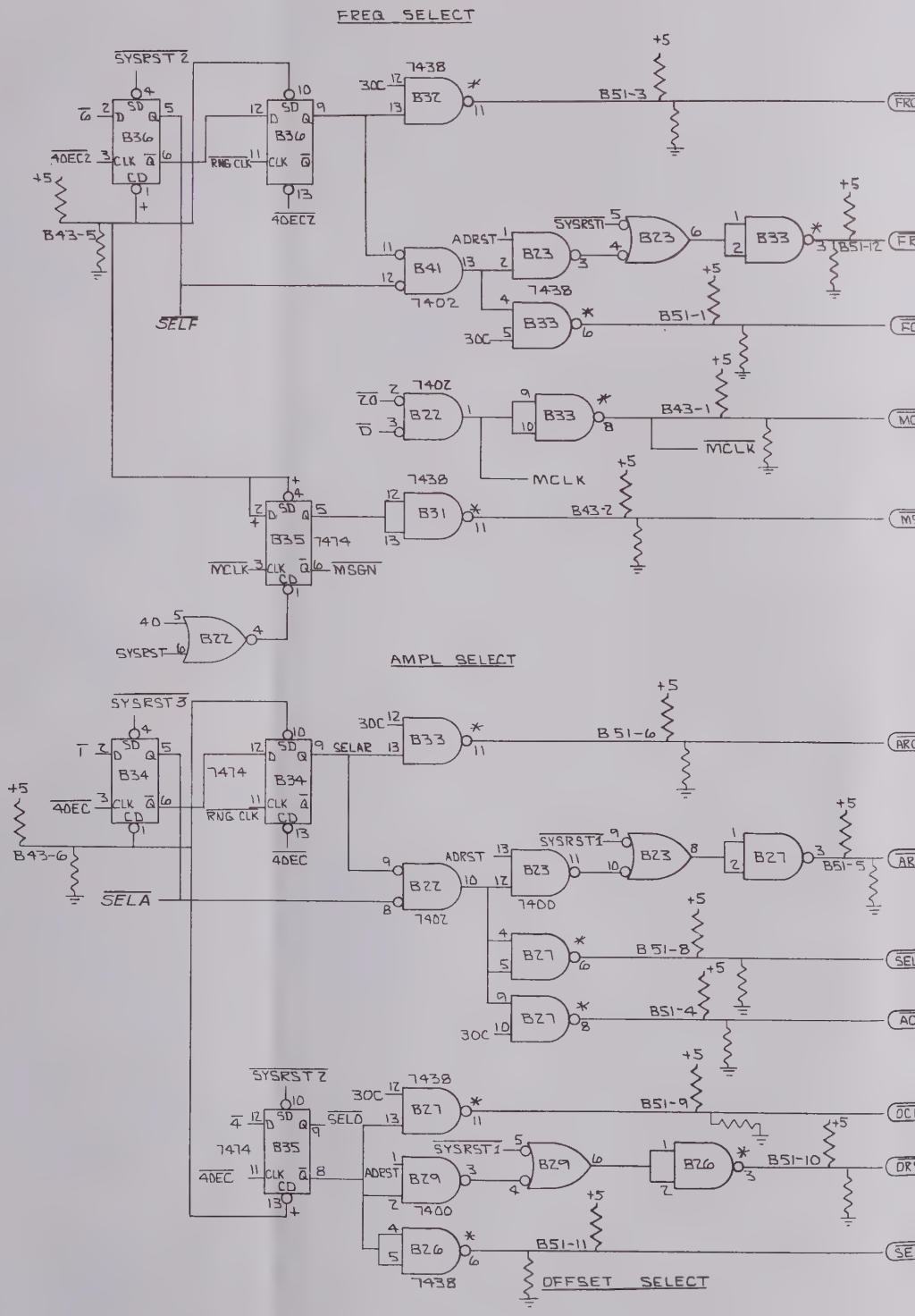
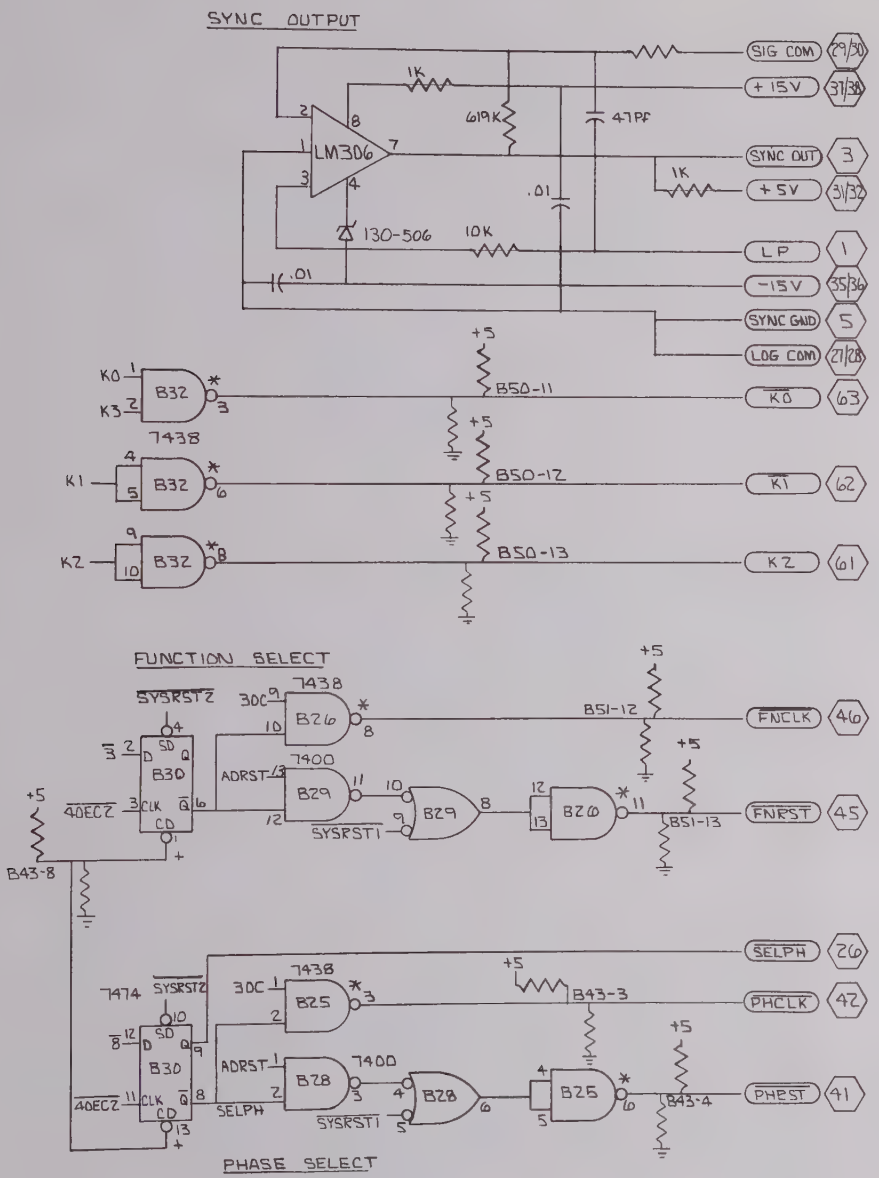


NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 3-25-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE SCHEMATIC LOGIC INTERFACE
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG		MODEL NO. 152 / DWG NO. D152-245 / REV C
	SCALE		CODE IDENT 23338 / SHEET 2 OF 2

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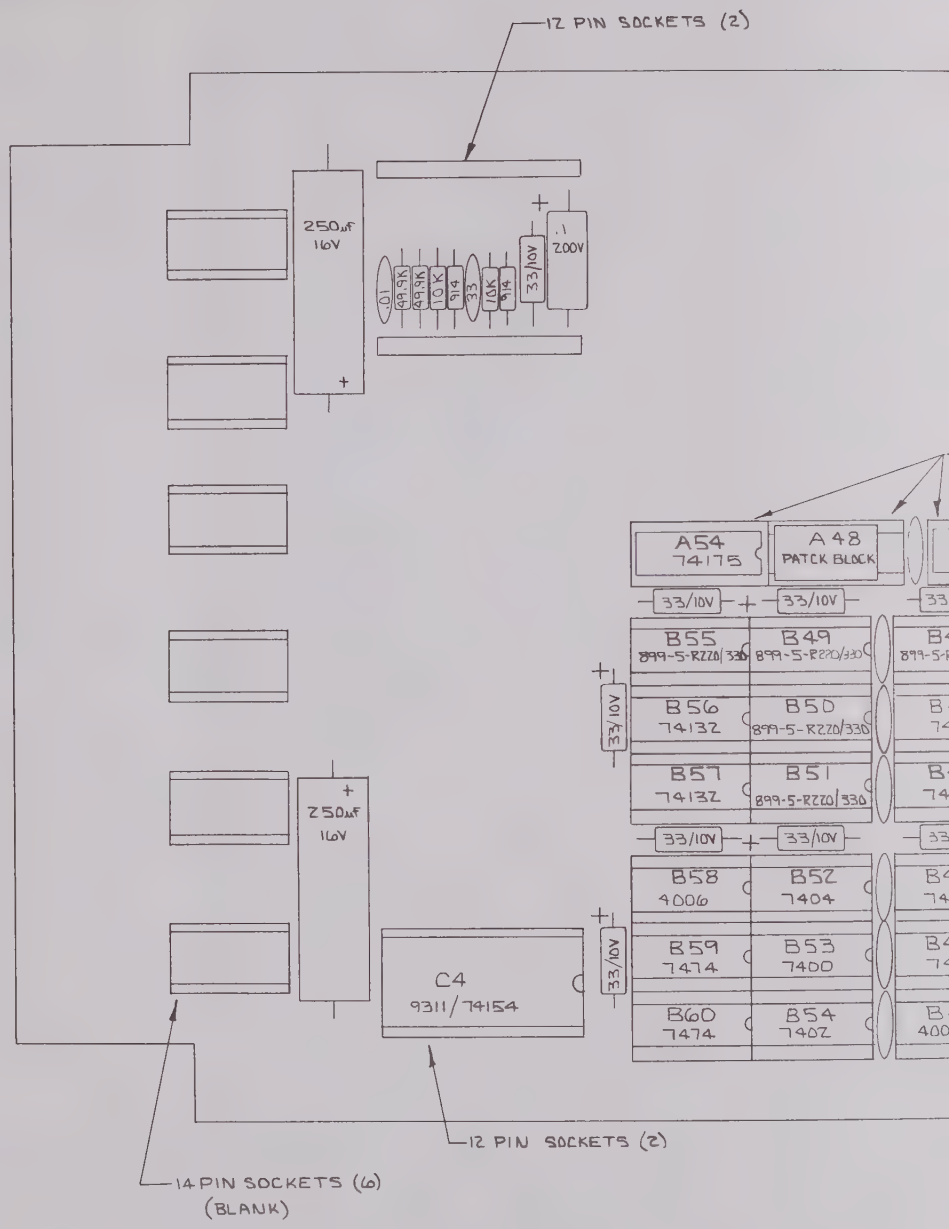
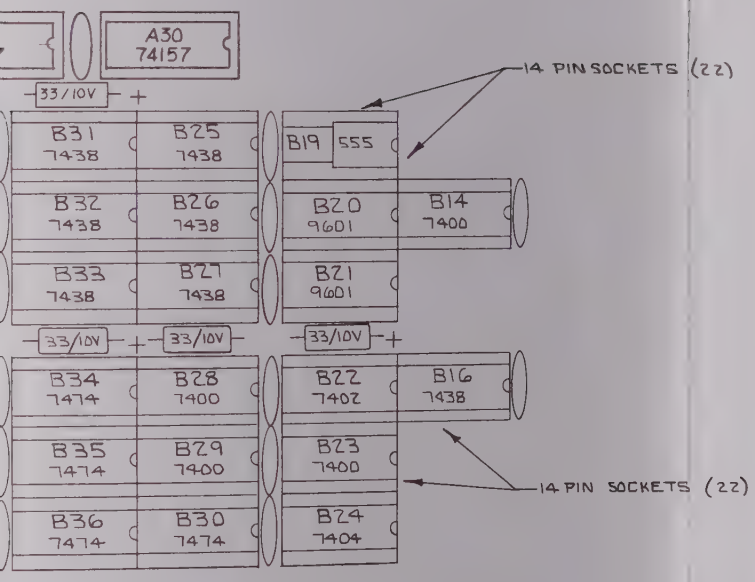


2. USE WIRE WRAP BD. 152-122.
1. ALL CAPS ARE .1µF @ 10V.

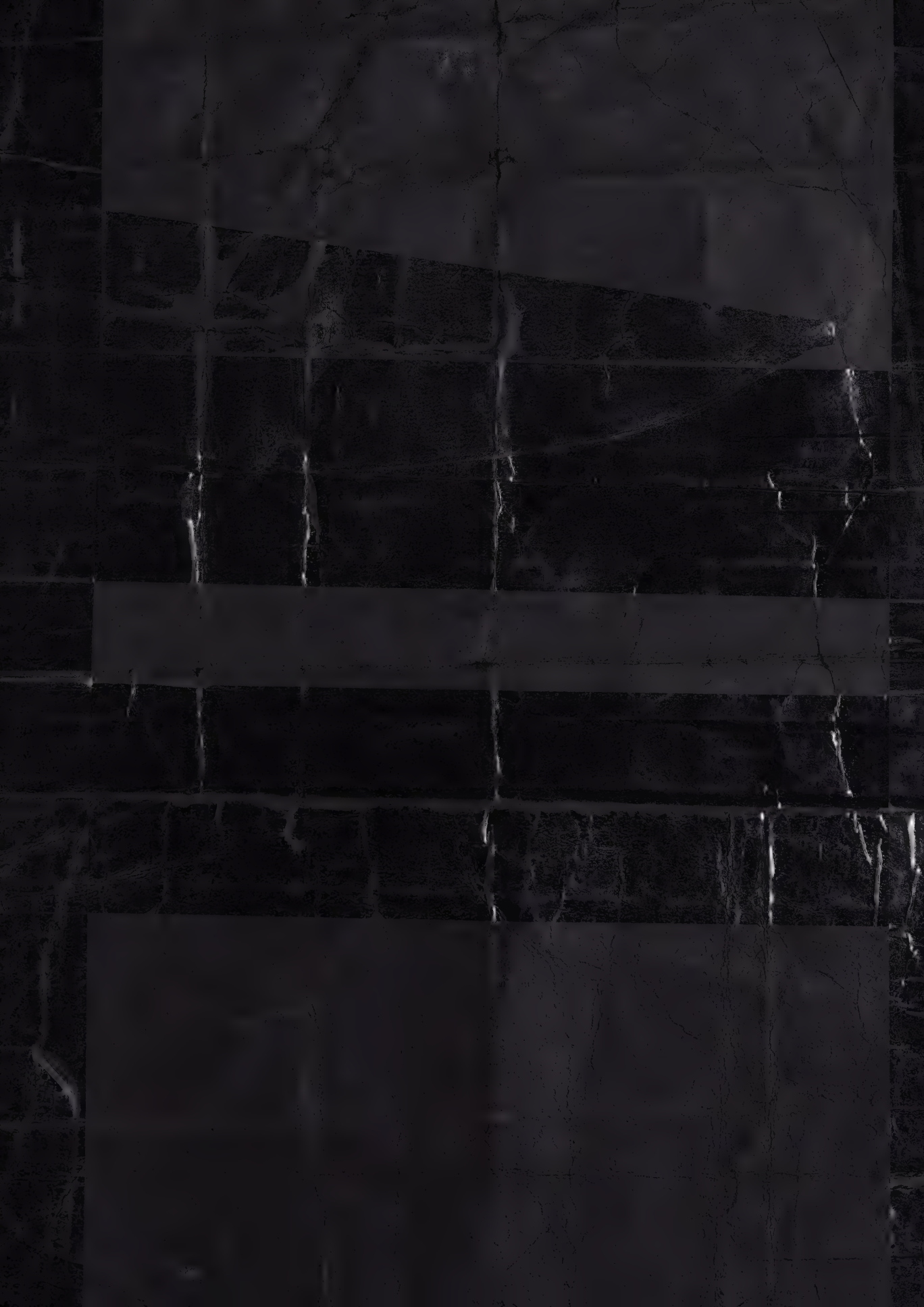
NOTE UNLESS OTHERWISE SPECIFIED

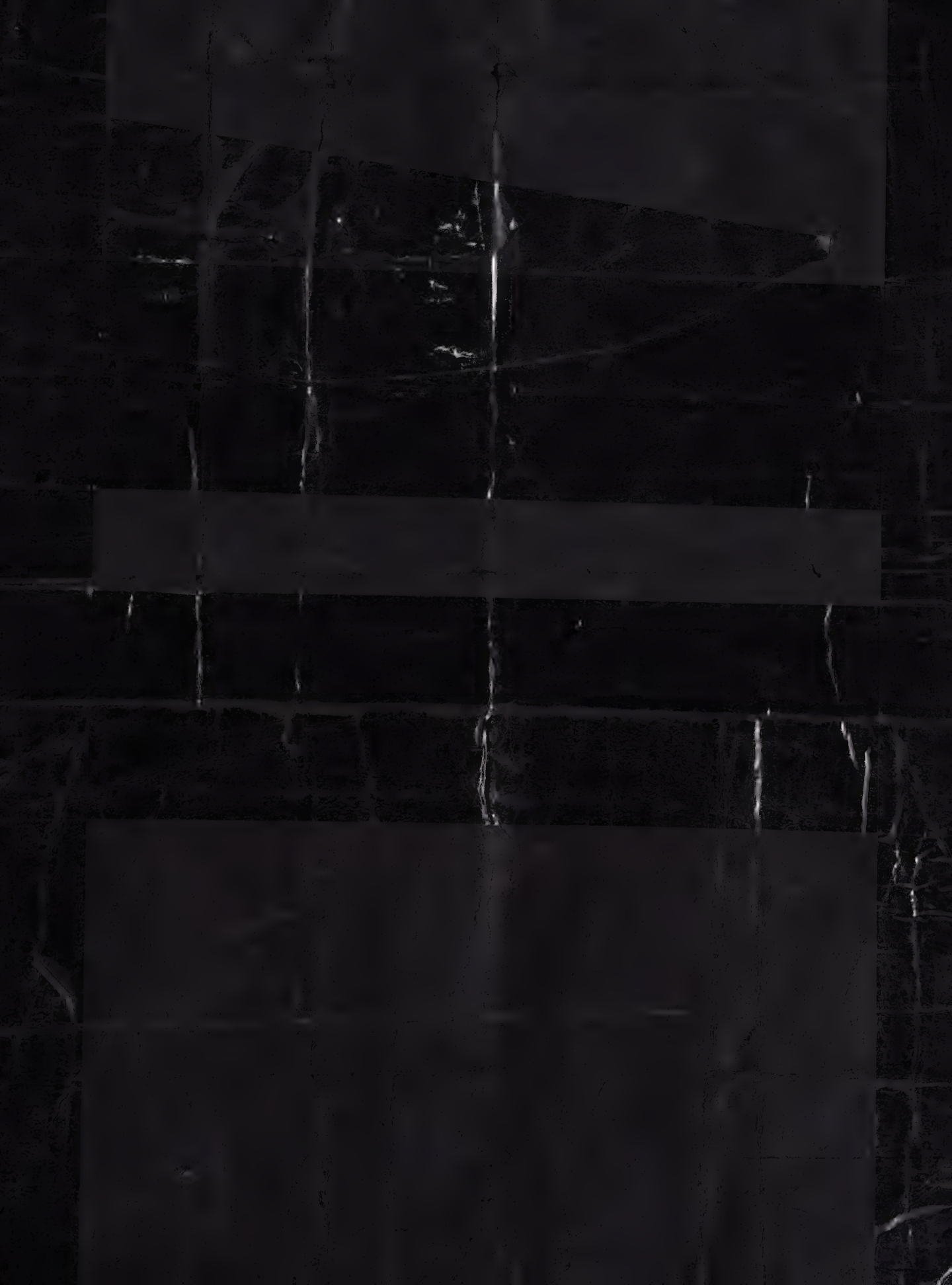
REV	ECN	BY	DATE	APP
C	ECN #2170	WTE	5-21-82	

S (3)



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BA	DATE 3317.5	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY LOGIC INTERFACE
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG		MODEL NO. 152 / DWG NO. D152-045 / REV C
	SCALE		CODE IDENT 23338 / SHEET 1 OF





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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO
NONE	BLOCK,CABLE MTG	152-328
NONE	MOTHER BOARD	152-130
NONE	CONN,15PIN	03-09-1151
NONE	PLUG,15PIN	03-09-2151
NONE	CONN	57-20240
NONE	CONN,EDGE,80 PIN	2HW4000-111
NONE	PIN,MALE	02-09-2118
NONE	PIN,FEMALE	02-09-1118
NONE	TERM	130981
NONE	CABLE CLAMP	835
NONE	CLAMP,CABLE	837
NONE	RETAINER,SPRING	D-191
NONE	GROMMET	GB2172/3068
NONE	GROMMET,RUBBER	2175

WAVETEK PARTS LIST | TITLE PCA MOTHER BD | ASSEMBLY 1100-00 | PAGE: 1

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO
NONE	CAP,CER,.01MF,50V	CK-103 LONG LEAD
NONE	CAP,CER,.1MF,10V	UK10-104
NONE	CAP,CER,33PF,1KV	DD-330
NONE	CAP,CER,47PF,1KV	DD-470 LONG LEAD
NONE	CAP,ELECT,250MF,16V	500D257G016DF7
NONE	CAP,TANT,33MF,10V	150D336X9010B2
NONE	SINE CALCULATOR	152-122
NONE	ADAPTER PLUG 14 PIN	6144-14
NONE	SKT,IC,14PIN,WW	CSA2200-14BC
NONE	SKT,IC,16PIN,WW	CSA2200-16BC
NONE	SKT,IC,12PIN,WW	CSA2300-12BC
NONE	CONN PIN,MALE (UOM-EA PIN)	CA-8368P-100-230-8
NONE	RES,MF,1/8W,1%,1K	RN55D-1001F
NONE	RES,MF,1/8W,1%,10K	RN55D-1002F
NONE	RES,MF,1/8W,1%,49.9K	RN55D-4992F
NONE	RES,MF,1/4W,1%,619K	RN60D-6193F
NONE	RES MODULE	899-5-R220/330

WAVETEK PARTS LIST | TITLE PCA,LOGIC INTERFACE | ASSEMBLY 1100-0 | PAGE: 1

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

MFGR	WAVETEK NO.	QTY/PT
WVTK	1400-00-8640	3
WVTK	1700-00-0670	1
MOLEX	2100-02-0012	4
MOLEX	2100-02-0013	1
AMPH	2100-02-0060	1
WINCH	2100-03-0054	15
MOLEX	2100-05-0005	15
MOLEX	2100-05-0026	60
USECO	2100-05-0046	10
SMITH	2800-00-0010	3
SMITH	2800-00-0011	2
WEKSR	2800-09-0007	3
ROYAL	2800-10-0001	1
SMITH	2800-10-0003	2

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	DIODE	1N4581	MICRO	4801-01-4581	1
NONE	DIODE	FD-6666	FAIR	4807-02-6666	2
NONE	IC	LM306H	NSC	7000-03-0600	1
NONE	IC	NE555V	SIG	7000-05-5500	1
NONE	IC	4006	MOT	8000-40-0600	2
NONE	IC	7400	TI	8000-74-0000	5
NONE	IC	7402	TI	8000-74-0200	4
NONE	IC	7404	TI	8000-74-0400	3
NONE	IC	7410	TI	8000-74-1000	2
NONE	IC	7438	TI	8000-74-3800	11
NONE	IC	7474	TI	8000-74-7400	7
NONE	IC	8311/9311	FAIR	8000-83-1100	1
NONE	IC	8601/9601	FAIR	8000-86-0100	2
NONE	IC	74132	TI	8007-41-3200	2
NONE	IC	74LS157	TI	8007-41-5710	2
NONE	IC	74161	TI	8007-41-6100	1
NONE	IC	74175	TI	8007-41-7500	1

WAVETEK PARTS LIST	TITLE: PCA,LOGIC INTERFACE	ASSEMBLY NO.: 1100-00-0152 PAGE: 2	REV: A

MFGR	WAVETEK NO.	QTY/PT
CRL	1500-01-0300	4
CRL	1500-01-0412	22
ARCO	1500-03-3011	1
DLCTW	1500-04-7001	1
SPRAG	1500-32-5101	2
SPRAG	1500-73-3601	15
WVTK	1700-00-0672	1
SAE	2100-02-0042	1
SAE	2100-03-0002	50
SAE	2100-03-0003	5
SAE	2100-03-0004	4
CA	2100-05-0034	30
TRW	4701-03-1001	2
TRW	4701-03-1002	4
TRW	4701-03-4992	2
TRW	4701-13-6193	1
BECK	4770-00-0004	5

REV A

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST LOGIC INTERFACE
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG		MODEL NO: 152 DWG NO: 1100-00-0152 REV: A
	SCALE		CODE IDENT: 23338 SHEET 1 OF 1

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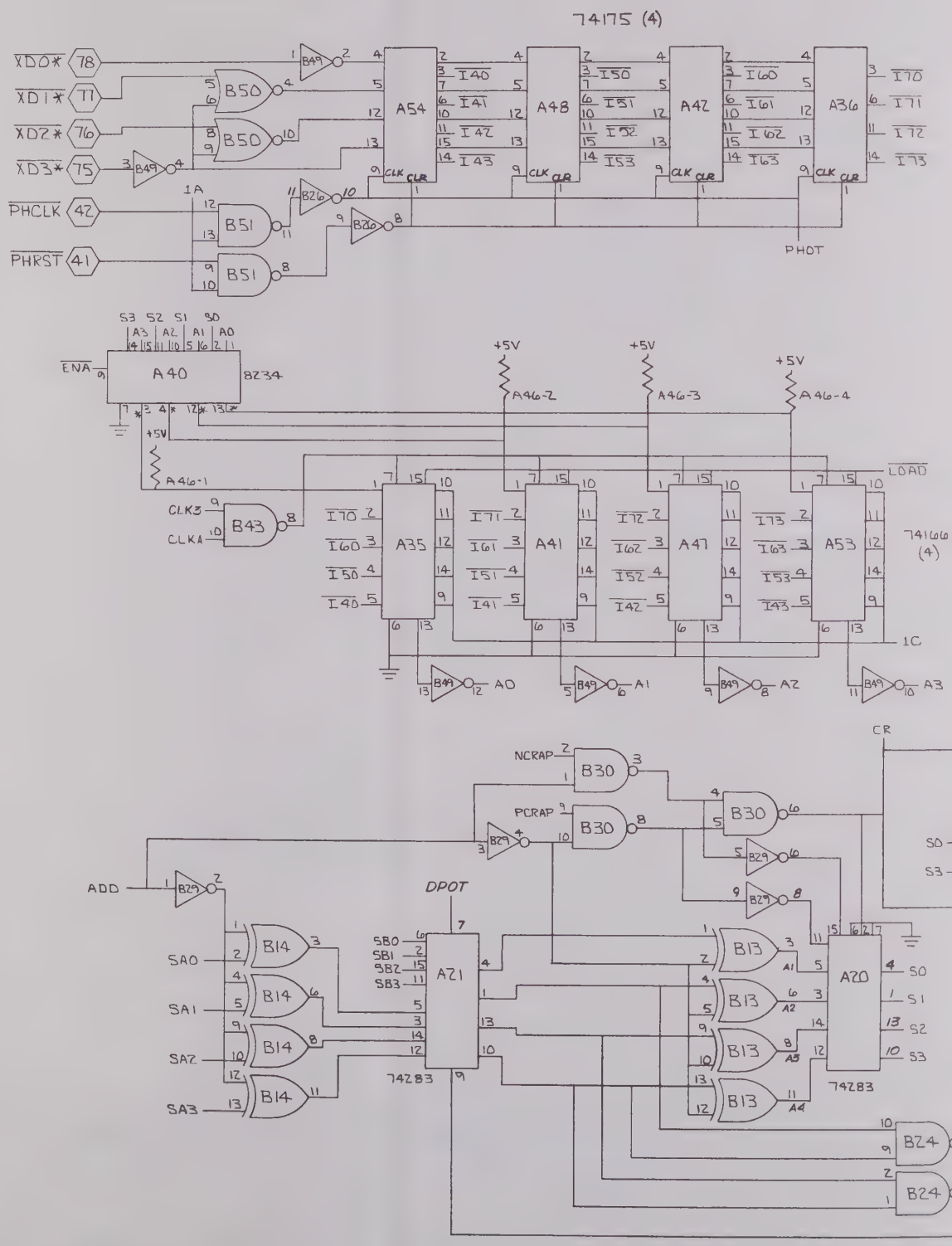
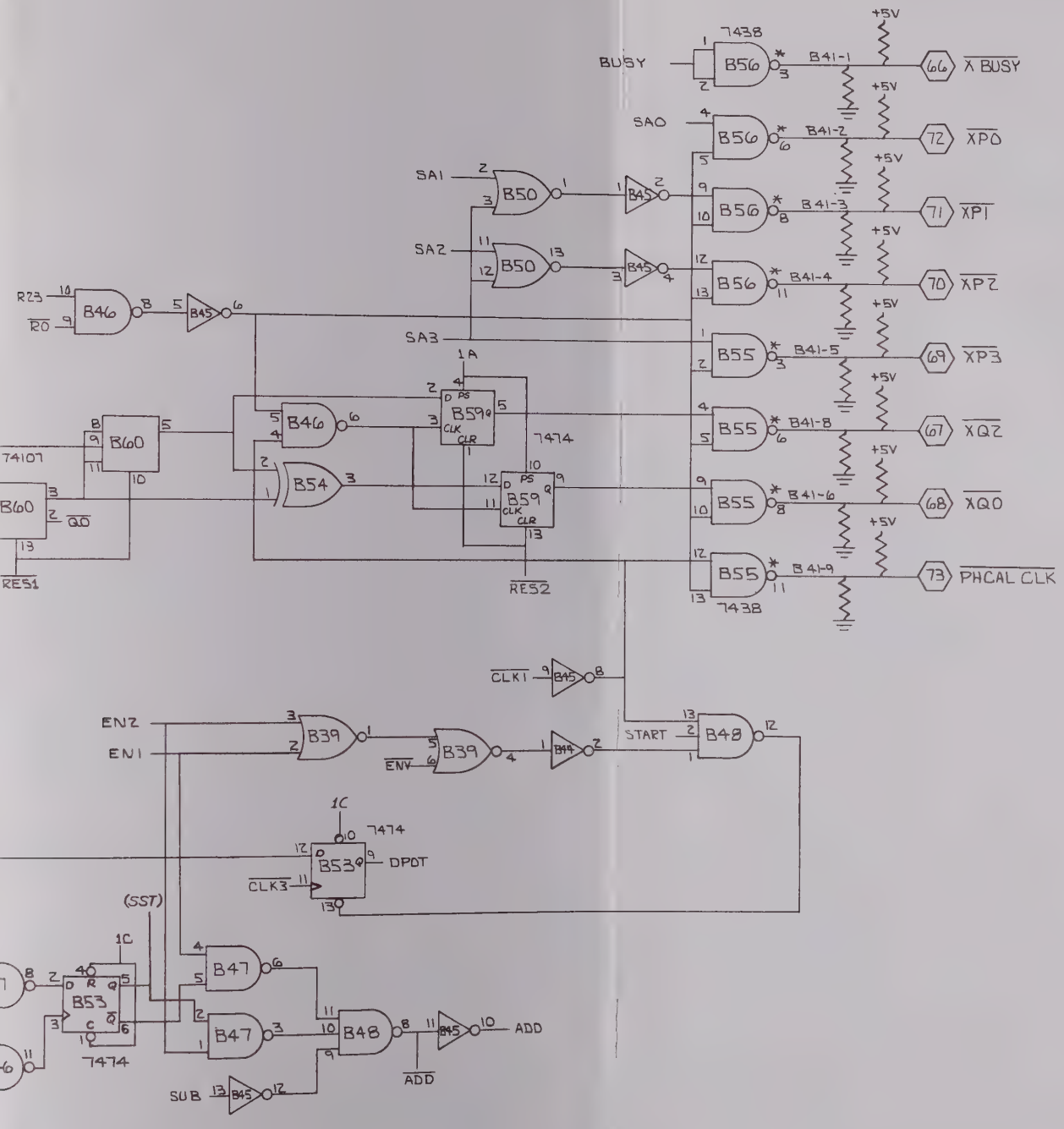
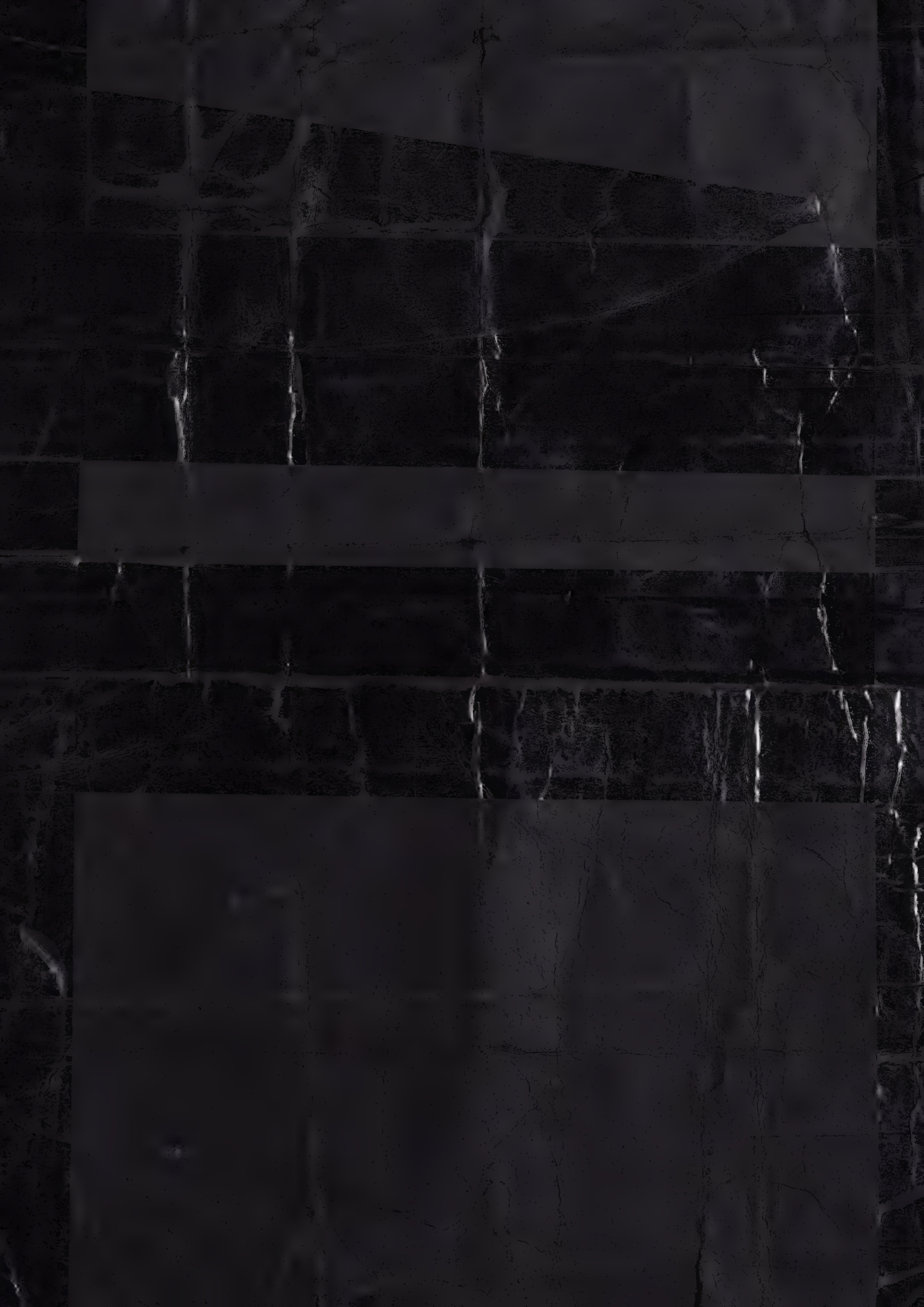


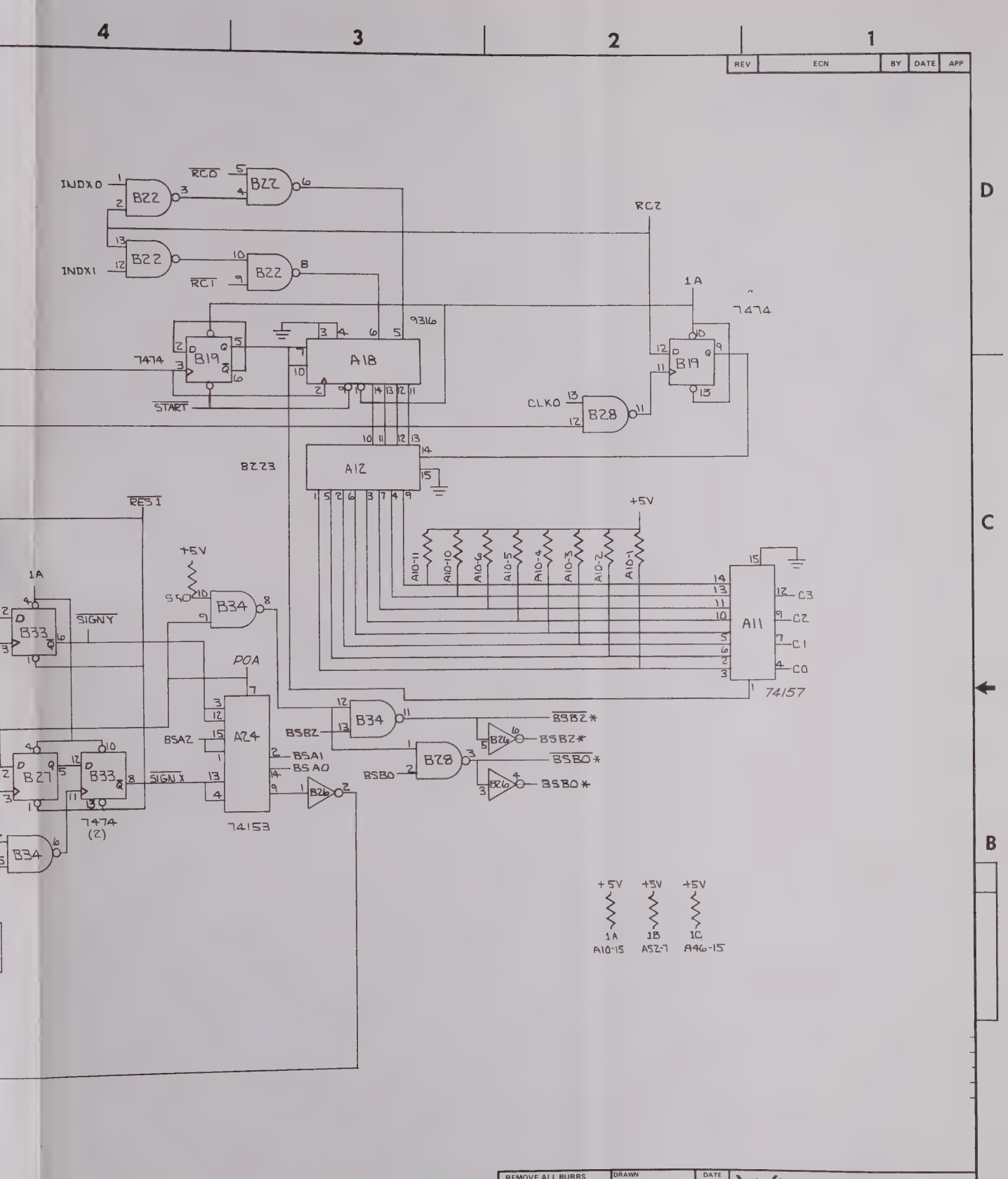
NOTE UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP
B	SEE ECN# 1805	DC	9-18-75	



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BA	DATE 9-11-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE SCHEMATIC SINE CALCULATOR
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1 .XX ±.030		
	DO NOT SCALE DWG		MODEL NO 152 DWG NO. D152-255 REV B
	SCALE		CODE IDENT 23338 SHEET 1 OF 3





REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BA	DATE 9-1175	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL /	PROJ ENGR		TITLE SCHEMATIC SINE CALCULATOR
	RELEASE APPROV		
FINISH WAVETEK PROCESS /	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° XX ±.030		MODEL NO 152
	DO NOT SCALE DWG		DWG NO D152-255
	SCALE /		REV B
			CODE IDENT 23338
			SHEET 2 OF 3

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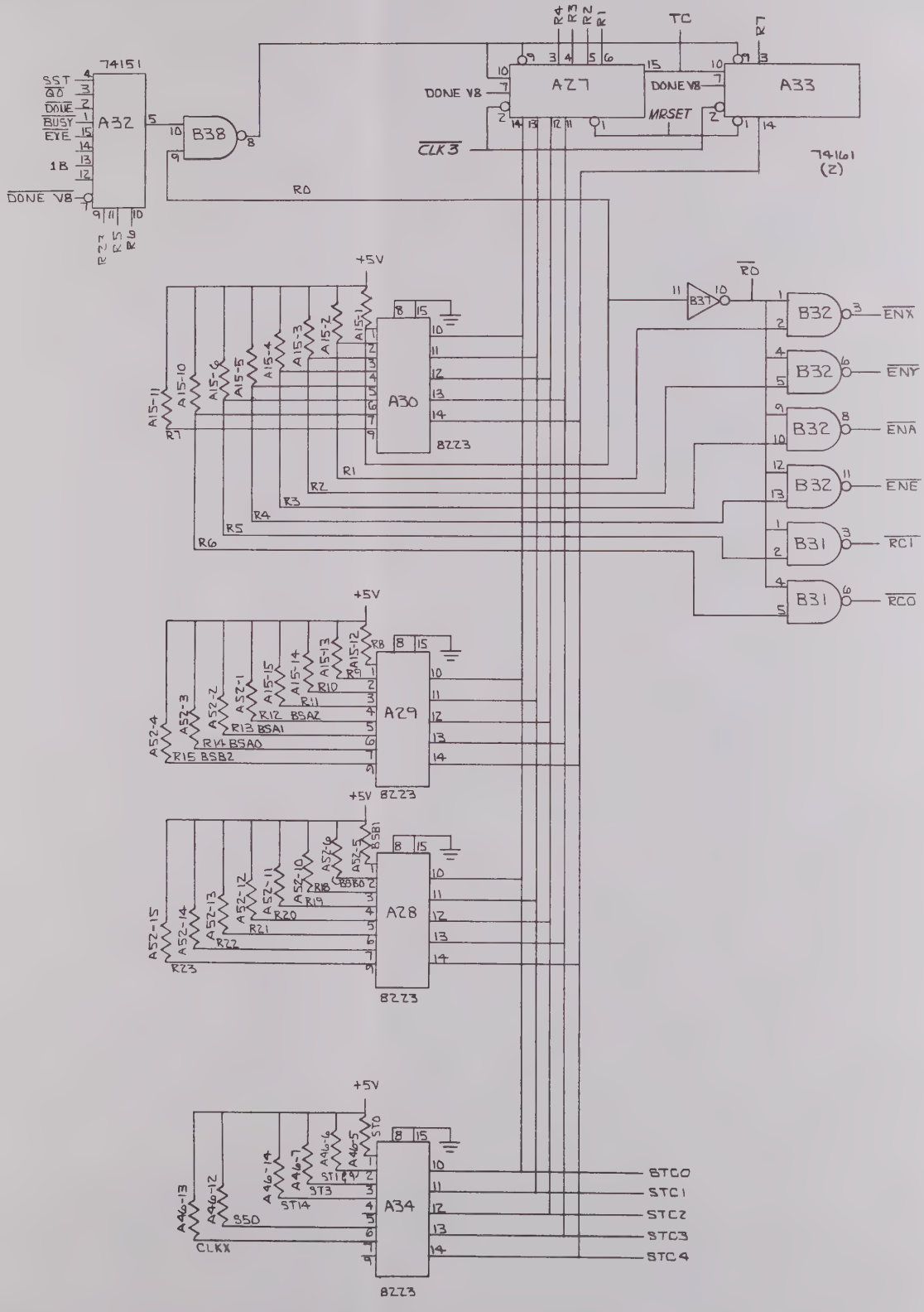
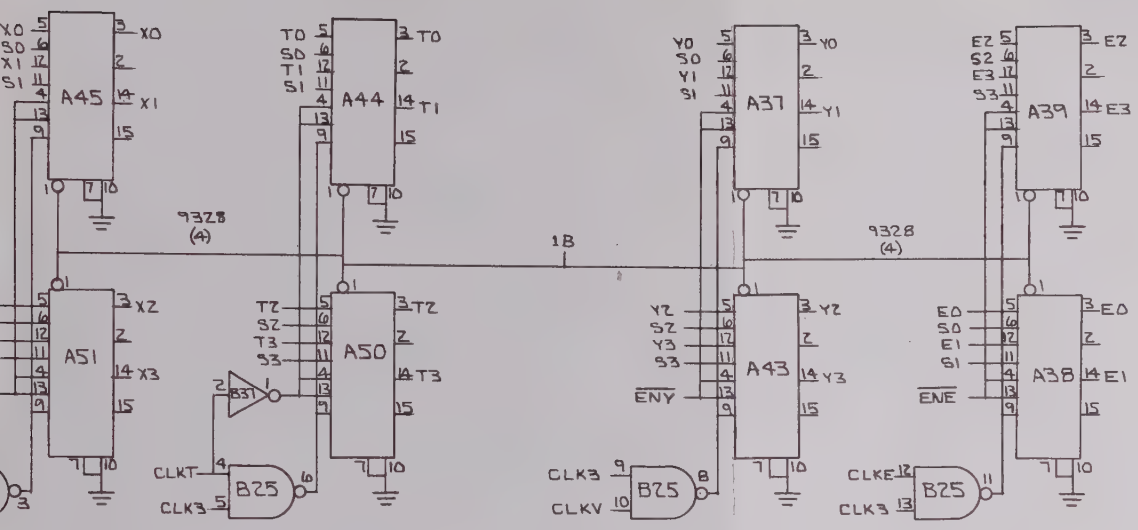


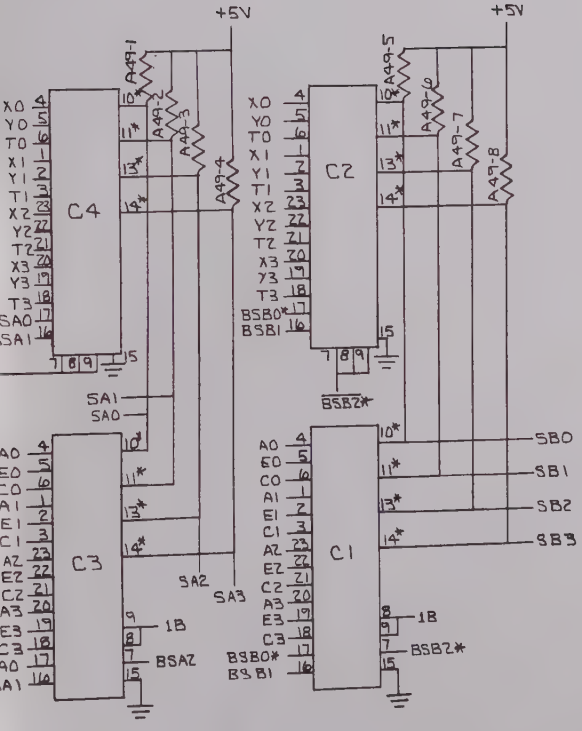
NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

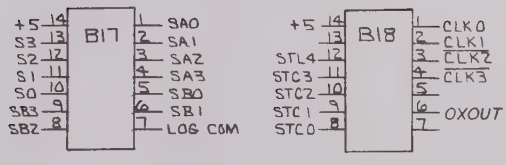


2.2 K DIP PACKAGES

A15	A10
A46	A41
A49	
A52	



TEST SOCKETS



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN BA	DATE 9-17-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL /	PROJ ENGR		TITLE SCHEMATIC SINE CALCULATOR
	RELEASE APPROV		
FINISH WAVETEK PROCESS /	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG		MODEL NO. 152 / DWG NO. D152-255 / REV B
	SCALE /		CODE IDENT 23338 / SHEET 3 OF 3

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION AND DESIGN RIGHTS BELONGING TO WAVETEK AND MAY NOT BE REPRODUCED FOR ANY REASON EXCEPT CALIBRATION, OPERATION, AND MAINTENANCE WITHOUT WRITTEN AUTHORIZATION.

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	CAP,CER,.1MF,10V	UK10-104	ARCO	1500-01-0412	43
NONE	CAP,MICA,100PF,500V	DM15-101J	ARCO	1500-11-0100	2
NONE	CAP,ELECT,250MF,16V	500D257G016DF7	SPRAG	1500-32-5101	2
NONE	CAP,TANT,33MF,10V	150D336X9010B2	SPRAG	1500-73-3601	33
NONE	SINE CALCULATOR	152-122	WVTK	1700-00-0672	1
NONE	SKT,IC,14PIN,WW	CSA2200-14BC	SAE	2100-03-0002	52
NONE	SKT,IC,16PIN,WW	CSA2200-16BC	SAE	2100-03-0003	39
NONE	SKT,IC,12PIN,WW	CSA2300-12BC	SAE	2100-03-0004	10
NONE	RES,MF,1/8,1%,499	RN55D-4990F	TRW	4701-03-4990	2
NONE	RES MODULE	899-1-R2.2K	BECK	4770-00-0002	5
NONE	RES MODULE	899-5-R220/330	BECK	4770-00-0004	1
NONE	IC	7400	TI	8000-74-0000	14
NONE	IC	7402	TI	8000-74-0200	2
NONE	IC	7404	TI	8000-74-0400	10
NONE	IC	7410	TI	8000-74-1000	2
NONE	IC	7437	TI	8000-74-3700	1
NONE	IC	7438	TI	8000-74-3800	3
NONE	IC	7474	TI	8000-74-7400	9

WAVETEK PARTS LIST	TITLE PCA,SINE CALCULATOR	ASSEMBLY NO. 1100-00-0672 PAGE: 1	REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	IC	7486	TI	8000-74-8600	3
NONE	IC	8234	SIG	8000-82-3400	1
NONE	IC	8264	SIG	8000-82-6400	4
NONE	IC	8277	FAIR	8000-82-7700	8
NONE	IC	9322	SIG	8000-93-2200	1
NONE	IC	74107	TI	8007-41-0700	1
NONE	IC	74151	TI	8007-41-5100	2
NONE	IC	74153	TI	8007-41-5300	1
NONE	IC	74161	TI	8007-41-6100	5
NONE	IC	74164	TI	8007-41-6400	1
NONE	IC	74166	TI	8007-41-6600	4
NONE	IC	74175	TI	8007-41-7500	4
NONE	IC,UNPROGRAMMED REF 8500 OR 8600 SERIES PART NUMBERS	74188	TI	8007-41-8800	5
NONE	IC	74283	TI	8007-42-8300	2

WAVETEK PARTS LIST	TITLE PCA,SINE CALCULATOR	ASSEMBLY NO. 1100-00-0672 PAGE: 2	REV

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE SINE CALC BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG		MODEL NO. 152 / DWG NO 1100-00-0672 / REV
	SCALE		CODE IDENT 23338 / SHEET 1 OF 1

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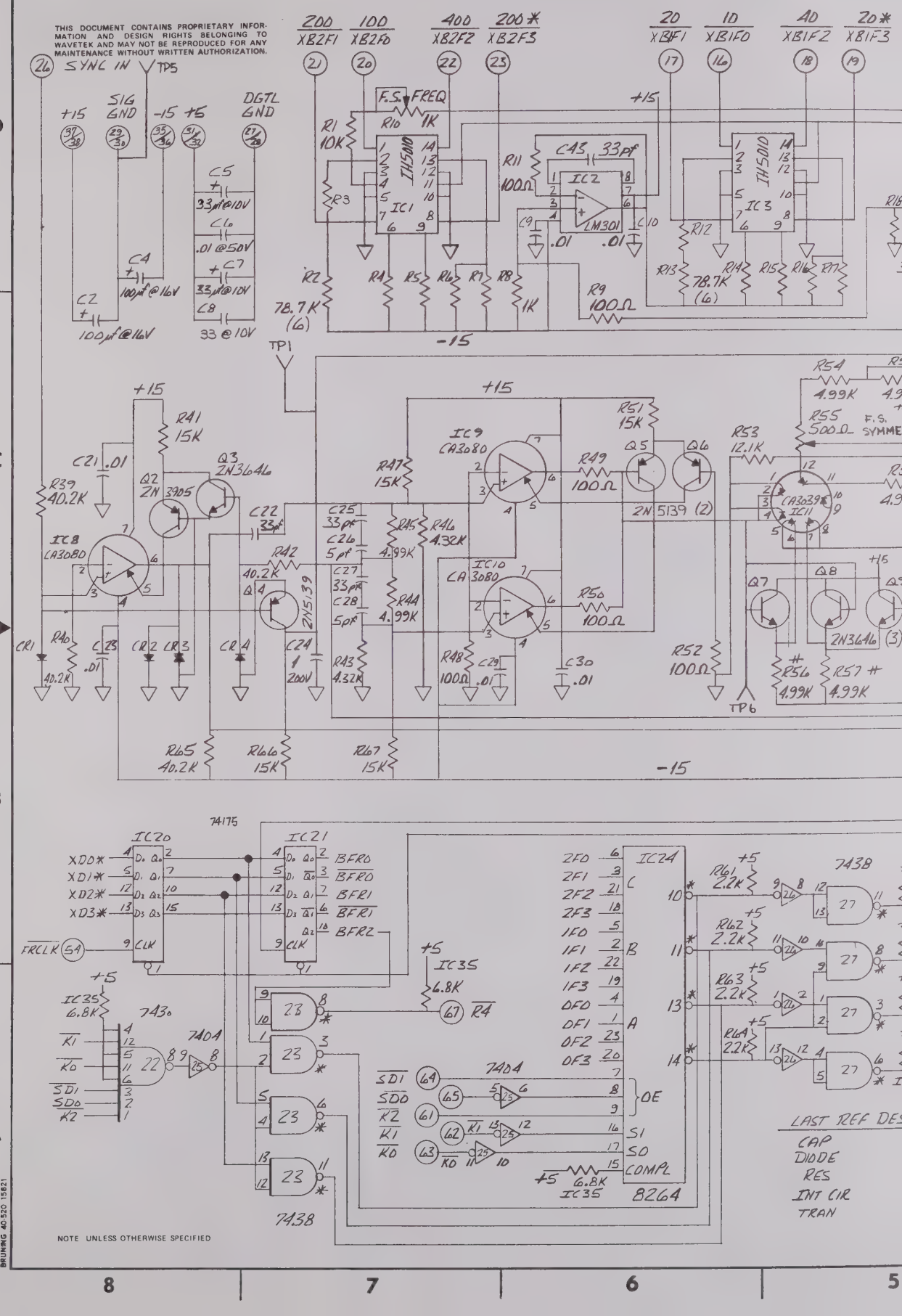
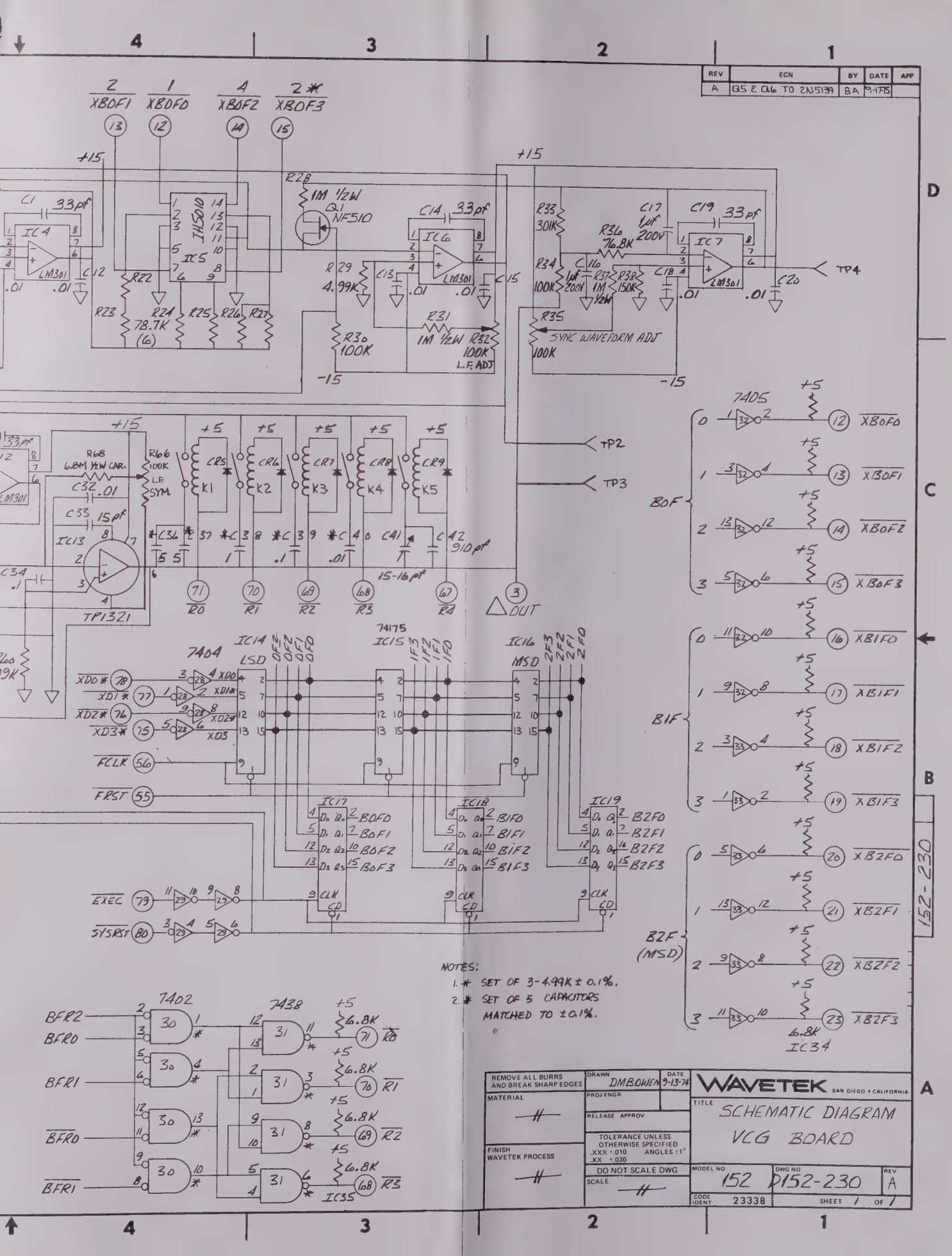
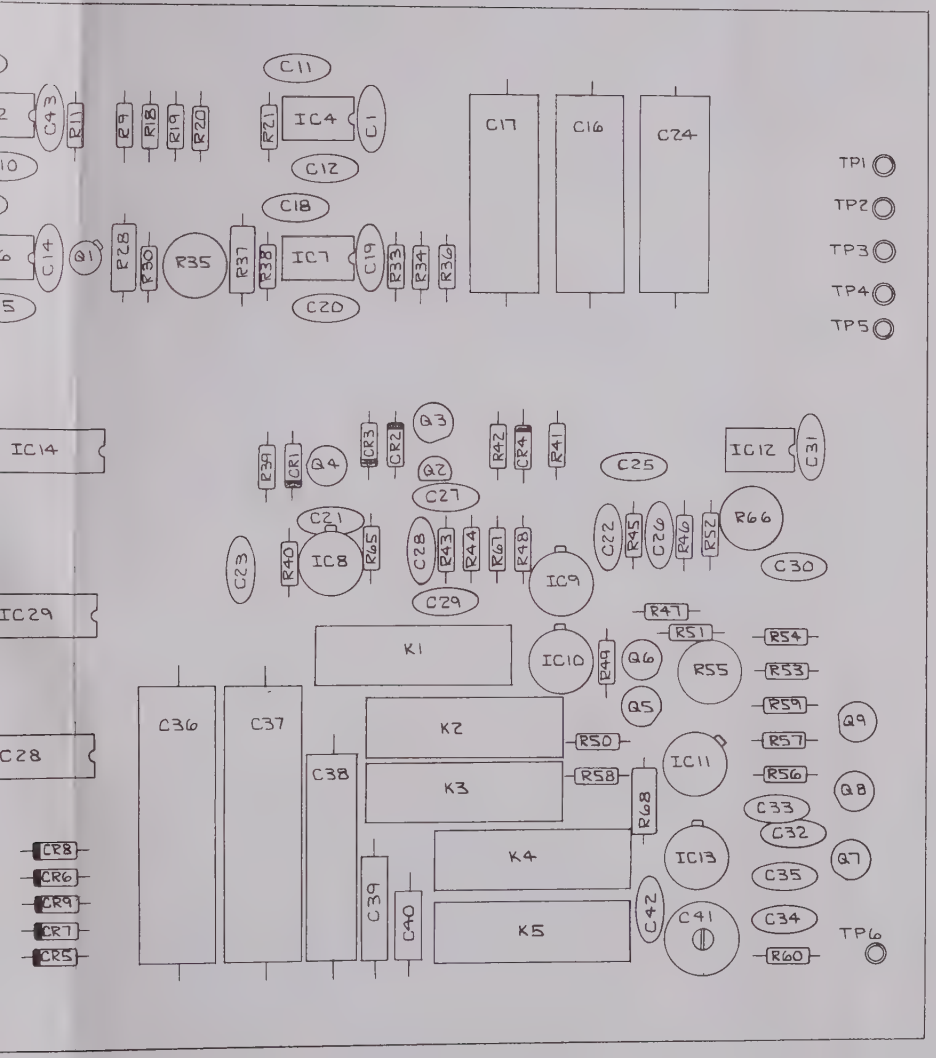


NOTE UNLESS OTHERWISE SPECIFIED

BRUNING 40-520 15821


REV | ECN | BY | DATE | APP
A | Q5 & Q6 TO 2N5139 | BA | 9-17-75
Z XBOF1
1 XBOFO
4 XBOF2
2* XBOF3
+15
IC1 33pf
IC4 LM301
IHS010
IC5
R22
R23
R24 78.7K (6)
R25
R26
R27
R28 1M 1/2W
Q1 NF510
C14 33pf
IC6 LM301
R29 4.99K
C13 .01
C15 .01
R30 100K
R31 1M 1/2W
R32 100K L.F. ADJ
-15
R33 301K
R34 100K
C16 1μf 200V
C17 1μf 200V
R36 76.8K
C19 33pf
IC7 LM301
R37 1M 1/2W
R38 150K
C18 .01
C20 .01
TP4
R35 100K SYNC WAVEFORM ADJ
TP2
TP3
R68 6.8M 1/2W CAR.
R66 100K L.F. SYM
C32 .01
C33 15pf
IC13
TP1321
CR5 CR6 CR7 CR8 CR9
K1 K2 K3 K4 K5
C36 C37 C38 C39 C40 C41 C42
.1 .01 910pf 15-16pf
71 70 69 68 67
R0 R1 R2 R3 R4
OUT
7405
BOF
XBOFO XBOF1 XBOF2 XBOF3
BIF
XBIFO XBIF1 XBIF2 XBIF3
B2F (MSD)
XB2FO XB2F1 XB2F2 XB2F3
6.8K IC34
7404
IC14 LSD
74175
IC15
IC16 MSD
XD0* XD1* XD2* XD3*
FCLK
FRST
IC17
IC18
IC19
BOFO BOF1 BOF2 BOF3
BIFO BIF1 BIF2 BIF3
B2FO B2F1 B2F2 B2F3
EXEC
SYSRST
NOTES:
1. # SET OF 3-4.99K ± 0.1%.
2. * SET OF 5 CAPACITORS MATCHED TO ±0.1%.
7402
7438
BFR2
BFR0
BFR1
BFR0
BFR1
IC35
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN DMBOWEN DATE 9-13-74
PROJ ENGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030
DO NOT SCALE DWG
SCALE
WAVETEK SAN DIEGO • CALIFORNIA
TITLE SCHEMATIC DIAGRAM VCG BOARD
MODEL NO 152
DWG NO 152-230
REV A
CODE IDENT 23338
SHEET 1 OF 1
152-230

REV	ECN	BY	DATE	APP



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 2-28-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY VCG BOARD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1 .XX ±.030		
	DO NOT SCALE DWG	MODEL NO 152	DWG NO D152-030 REV
	SCALE	CODE IDENT 23338	SHEET 1 OF

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REFERENCE DESIGNATORS	PART DESCRIPTION
NONE	CAP,CER,5PF,1KV
NONE	CAP,CER,10PF,1KV
NONE	CAP,CER,.01MF,50V
NONE	CAP,CER,.1MF,50V
NONE	CAP,CER,33PF,1KV
NONE	CAP,MICA,910PF,100
NONE	CAP,ELECT,100MF,16
NONE	CAP,POLYC,1MF,100V
NONE	VARI,15-60PF,200V
NONE	CAP,TANT,33MF,10V
NONE	CAP,SET,POLYC CONSIST:1509-90-00 THRU:0004
NONE	VCG BOARD
NONE	PIN,MALE
NONE	RELAY,REED,FORM-A
NONE	POT,TRIM,1K
NONE	POT,TRIM,100K
NONE	POT,TRIM,500

WAVETEK PARTS LIST

TITLE
PCA,VCG

REFERENCE DESIGNATORS	PART DESCRIPTION
NONE	RES,C,1/2W,5%,1M
NONE	RES,C,1/2W,10%,6.
NONE	RES,MF,1/8W,1%,10
NONE	RES,MF,1/8W,1%,1K
NONE	RES,MF,1/8W,1%,10
NONE	RES,MF,1/8W,1%,10
NONE	RES,MF,1/8W,1%,10
NONE	RES,MF,1/8W,1%,12
NONE	RES,MF,1/8W,1%,15
NONE	RES,MF,1/8W,1%,19
NONE	RES,MF,1/8W,1%,2.
NONE	RES,MF,1/8W,1%,30
NONE	RES,MF,1/8W,1%,33
NONE	RES,MF,1/8W,1%,40
NONE	RES,MF,1/8W,1%,4.
NONE	RES,MF,1/8W,1%,4.
NONE	RES,MF,1/8W,1%,76

WAVETEK PARTS LIST

TITLE
PCA,VCG

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

PART-NO	MFGR	WAVETEK NO.	QTY/PT
	CRL	1500-00-5011	2
	CRL	1500-01-0011	1
G LEAD	CRL	1500-01-0300	15
	CRL	1500-01-0410	1
	CRL	1500-03-3011	8
	ARCO	1500-19-1101	1
DC7	SPRAG	1500-31-0101	2
F	IMB	1500-41-0504	3
F	ERIE	1500-56-0010	1
0B2	SPRAG	1500-73-3601	3
	WVTK	1509-80-0005	1
	WVTK	1700-00-0145	1
	AMP	2100-05-0020	6
	ETROL	4500-00-0007	5
	BECK	4600-01-0209	1
	BECK	4600-01-0402	3
	BECK	4600-05-0104	1

ASSEMBLY NO.	REV
1100-00-0145	
PAGE: 1	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES,MF,1/8W,1%,78.7K	RN55D-7872F	TRW	4701-03-7872	18
NONE	RES MODULE	899-1-R6.8K	BECK	4770-00-0003	2
NONE	RES,SET,3-4.99K,1/8W QTY:3:4701-03-4991	4789-00-0046	WVTK	4789-00-0046	1
NONE	DIODE	FD-6666	FAIR	4807-02-6666	9
NONE	TRANS	2N3646	FAIR	4901-03-6460	4
NONE	TRANS	2N3905	FAIR	4901-03-9050	1
NONE	TRANS	2N5139	FAIR	4901-05-1390	3
NONE	TRANS	NF-510	NSC	4902-00-5100	1
NONE	IC	LM 301AN	NSC	7000-03-0100	5
NONE	IC	TP1321	TLDYN	7000-13-2100	1
NONE	IC	CA-3080	RCA	7000-30-8000	3
NONE	IC	5010	INTSL	7000-50-1000	3
NONE	IC,CLASS I,CA-3039 QTY:1:7000-30-3900	130-501-18	WVTK	7200-00-0004	1
NONE	IC	7402	TI	8000-74-0200	1
NONE	IC	7404	TI	8000-74-0400	4
NONE	IC	7405	TI	8000-74-0500	2

WAVETEK PARTS LIST	TITLE PCA,VCG	ASSEMBLY NO. 1100-00-0145	REV
		PAGE: 3	

ART-NO	MFGR	WAVETEK NO.	QTY/PT
	STKPL	4700-25-1004	3
	STKPL	4700-25-6804	1
	TRW	4701-03-1000	6
	TRW	4701-03-1001	1
	TRW	4701-03-1002	1
	TRW	4701-03-1003	1
	TRW	4701-03-1009	1
	TRW	4701-03-1212	1
	TRW	4701-03-1502	5
	TRW	4701-03-1503	1
	TRW	4701-03-2211	4
	TRW	4701-03-3013	1
	TRW	4701-03-3329	3
	TRW	4701-03-4022	4
	TRW	4701-03-4321	2
	TRW	4701-03-4991	6
	TRW	4701-03-7682	1

ASSEMBLY NO.	REV
1100-00-0145	
PAGE: 2	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	IC	7430	TI	8000-74-3000	1
NONE	IC	7438	TI	8000-74-3800	3
NONE	IC	8264	SIG	8000-82-6400	1
NONE	IC	74175	TI	8007-41-7500	8

WAVETEK PARTS LIST	TITLE PCA,VCG	ASSEMBLY NO. 1100-00-0145	REV
		PAGE: 4	

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE VCG BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		MODEL NO 152 / DWG NO 1100-00-0145 / REV
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET 1 OF 1
	SCALE		

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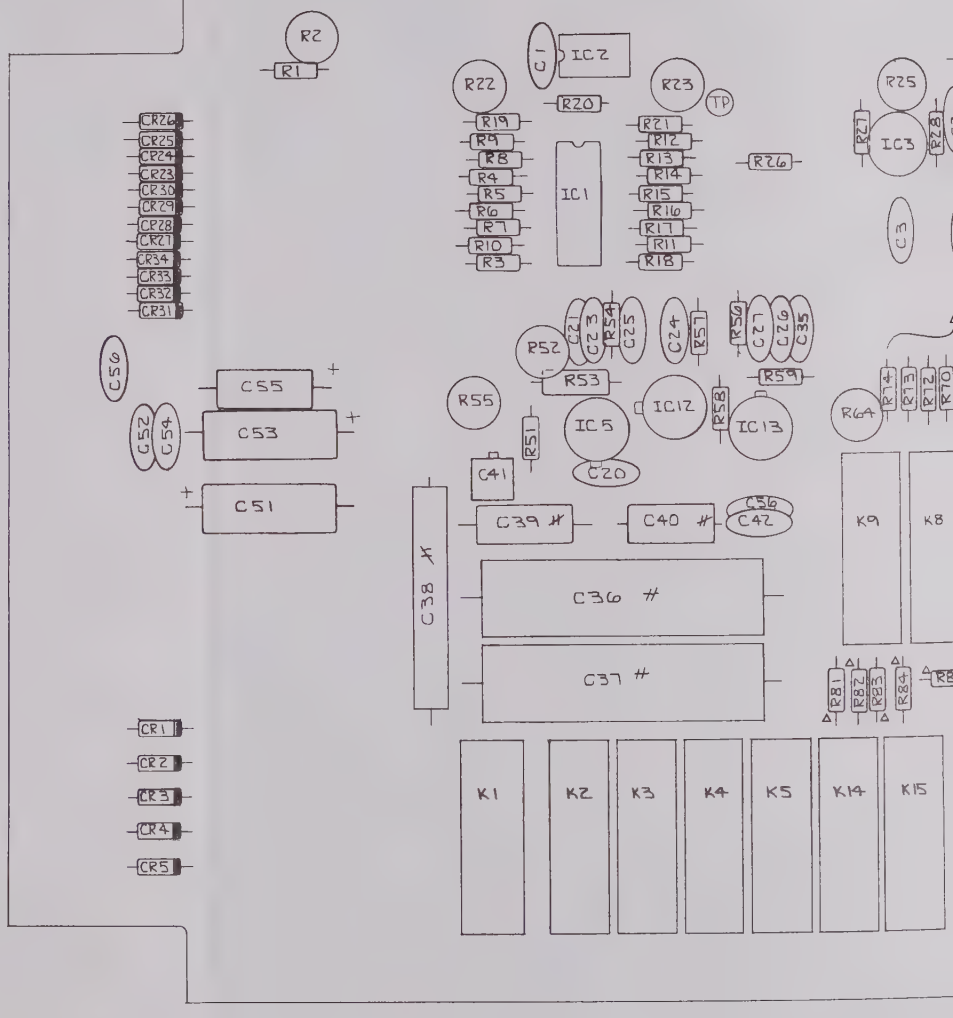
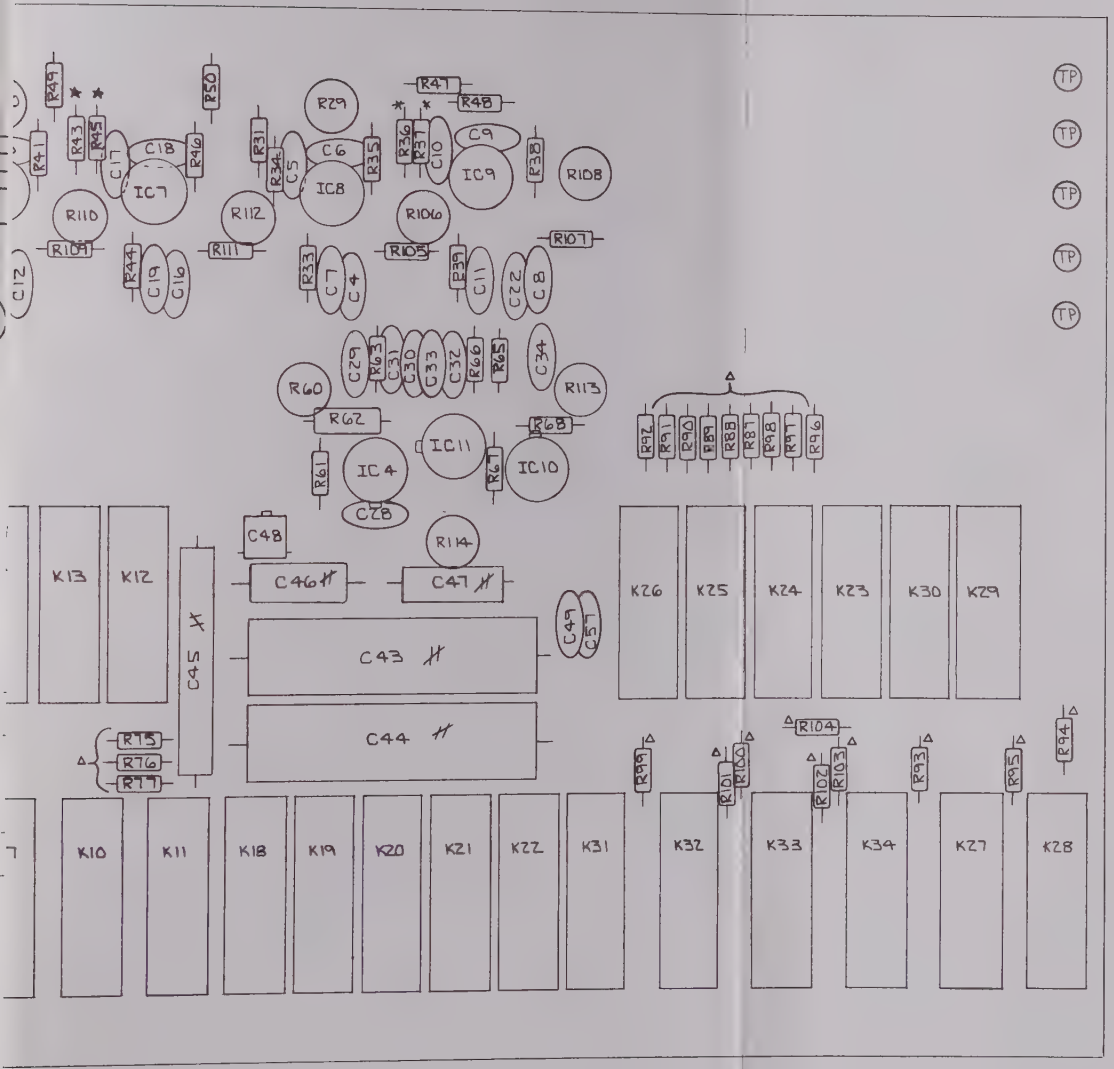


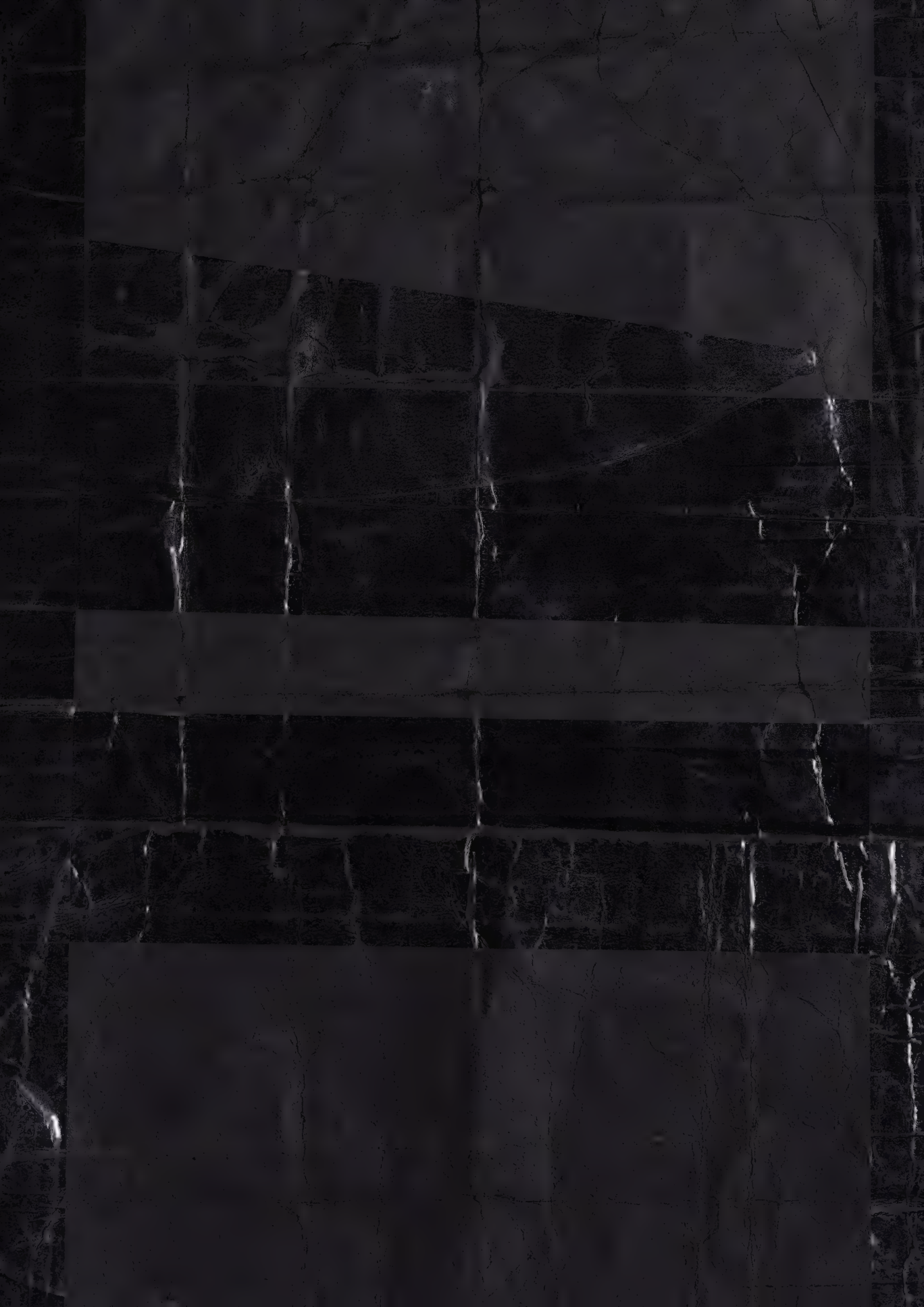
4. Δ MATCHED SET TO ± 0.1%
3. # MATCHED SET ±0.1% OF PRINTED VALUE
2. * MATCHED SET ±0.1%
1. ★ MATCHED SET ±0.1%

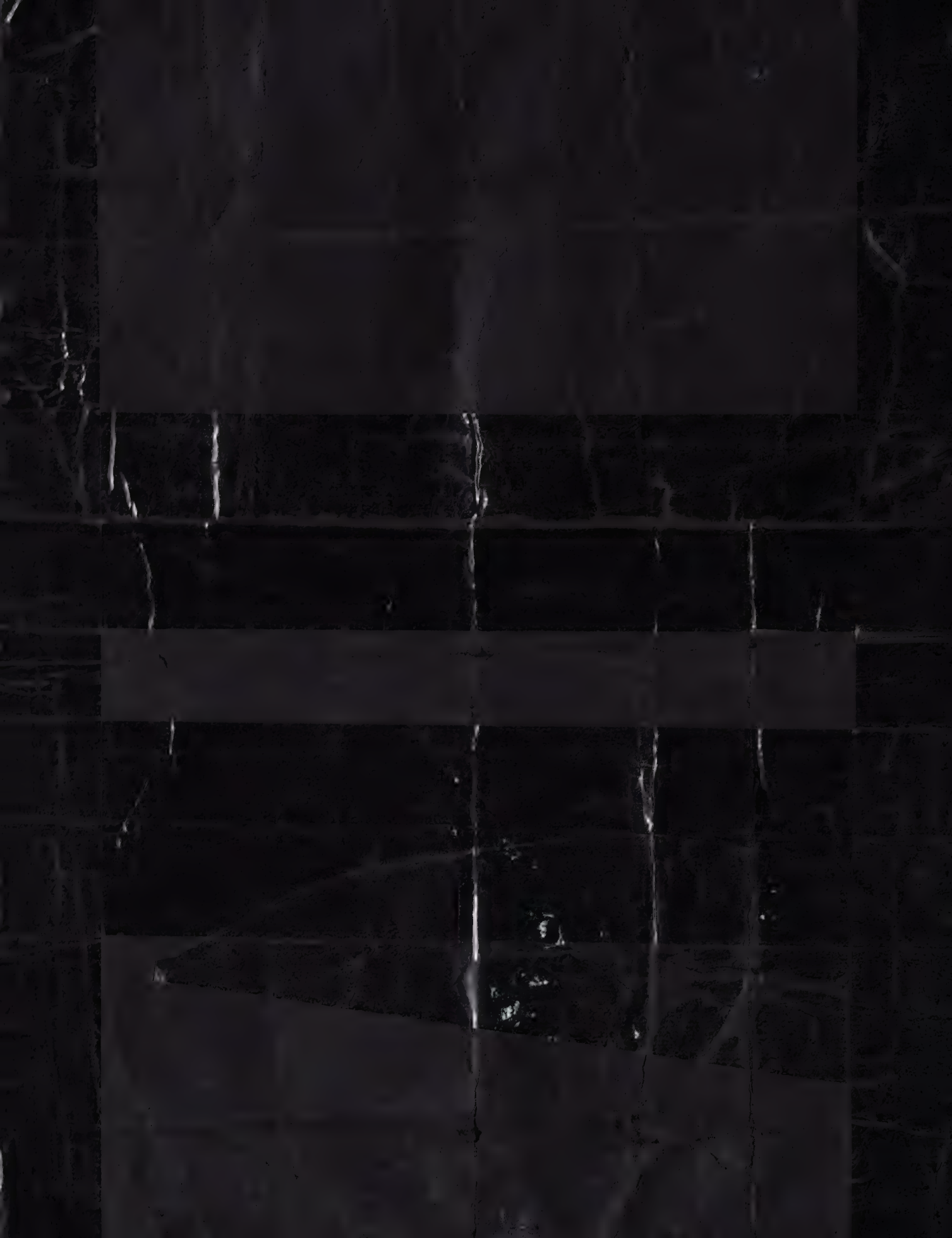
NOTE UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN ADKINS	DATE 2-13-75	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY FILTER BOARD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO. 152	DWG NO. D152-032 REV A
	SCALE 2/1	CODE IDENT 23338	SHEET 1 OF





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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART
NONE	CAP,CER,5PF,1KV	DD-050
NONE	CAP,CER,100PF,1KV	DD-101
NONE	CAP,CER,.01MF,50V	CK-103 LONG LE
NONE	CAP,CER,33PF,1KV	DD-330 LONG LE
NONE	CAP,MICA,47PF,500V	DM15-470J
NONE	CAP,MICA,910PF,100V	DM15-911F
NONE	CAP,ELECT,100MF,16V	500D107G016DC7
NONE	VARI,15-60PF,200V	538-006-112F
NONE	CAP,TANT,33MF,10V	150D336X9010B2
NONE	CAP,SET,POLYC CONSIST:1509-90-0001 THRU:0004	130-501-6
NONE	FILTER BOARD	152-132-REPEAT
NONE	ADAPTER PLUG 16 PIN	616-8G1
NONE	RELAY,REED,FORM-A	RA3019-1051
NONE	POT,TRIM,100	91AR100
NONE	POT,TRIM,1K	91AR1K
NONE	POT,TRIM,100K	91AR100K
NONE	POT,TRIM,500	91AR500

WAVETEK PARTS LIST	TITLE PCA,FILTER	ASS 110 PAG

NOTE UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

	MFGR	WAVETEK NO.	QTY/PT
	CRL	1500-00-5011	5
	CRL	1500-01-0111	6
C	CRL	1500-01-0300	25
	CRL	1500-03-3001	3
	ARCO	1500-14-7000	2
	ARCO	1500-19-1101	2
	SPRAG	1500-31-0101	2
	ERIE	1500-56-0000	2
	SPRAG	1500-73-3601	1
	WVTK	1509-80-0005	2
	WVTK	1700-00-0146	1
	AUGAT	2100-02-0062	1
	ETROL	4500-00-0007	34
	BECK	4600-01-0103	3
	BECK	4600-01-0209	4
	BECK	4600-01-0402	7
	BECK	4600-05-0104	2

.Y NO. 0-0146		REV
1		

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES,C,1/2W,5%,2.7M	RC20GF-275	STKPL	4700-25-2704	2
NONE	RES,MF,1/8W,1%,100	RN55D-1000F	TRW	4701-03-1000	7
NONE	RES,MF,1/8W,1%,1K	RN55D-1001F	TRW	4701-03-1001	6
NONE	RES,MF,1/8W,1%,10K	RN55D-1002F	TRW	4701-03-1002	4
NONE	RES,MF,1/8W,1%,100K	RN55D-1003F	TRW	4701-03-1003	1
NONE	RES,MF,1/8W,1%,12.1K	RN55D-1212F	TRW	4701-03-1212	3
NONE	RES,MF,1/8W,1%,15K	RN55D-1502F	TRW	4701-03-1502	2
NONE	RES,MF,1/8W,1%,150K	RN55D-1503F	TRW	4701-03-1503	2
NONE	RES,MF,1/8W,1%,178K	RN55D-1783F	TRW	4701-03-1783	4
NONE	RES,MF,1/8W,1%,18.2K	RN55D-1822F	TRW	4701-03-1822	1
NONE	RES,MF,1/8W,1%,200	RN55D-2000F	TRW	4701-03-2000	1
NONE	RES,MF,1/8W,1%,21.5K	RN55D-2152F	TRW	4701-03-2152	2
NONE	RES,MF,1/8W,1%,221	RN55D-2210F	TRW	4701-03-2210	4
NONE	RES,MF,1/8W,1%,2.49K	RN55D-2491F	TRW	4701-03-2491	4
NONE	RES,MF,1/8W,1%,274	RN55D-2740F	TRW	4701-03-2740	1
NONE	RES,MF,1/8W,1%,30.1K	RN55D-3012F	TRW	4701-03-3012	2
NONE	RES,MF,1/8W,1%,301K	RN55D-3013F	TRW	4701-03-3013	1

WAVETEK PARTS LIST	TITLE PCA,FILTER	ASSEMBLY NO. 1100-00-0146 PAGE: 2	REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES,MF,1/8W,1%,4.75K	RN55D-4751F	TRW	4701-03-4751	2
NONE	RES,MF,1/8,1%,499	RN55D-4990F	TRW	4701-03-4990	1
NONE	RES,MF,1/8W,1%,4.99K	RN55D-4991F	TRW	4701-03-4991	5
NONE	RES,MF,1/8W,1%,49.9K	RN55D-4992F	TRW	4701-03-4992	1
NONE	RES,MF,1/8W,1%,56.2K	RN55D-5622F	TRW	4701-03-5622	2
NONE	RES,SET,4=4.99K,1/8W QTY:4:4701-03-4991	180-500-100A	WVTK	4789-00-0039	1
NONE	RES,SET,36-7.87K QTY:36:4701-03-7871	4789-00-0045	WVTK	4789-00-0045	1
NONE	DIODE	FD-6666	FAIR	4807-02-6666	17
NONE	IC	LM 301AN	NSC	7000-03-0100	1
NONE	IC	7000-03-1000	WVTK	7000-03-1000	4
NONE	IC	LM318H	NSC	7000-03-1800	7
NONE	IC	CA-3019	RCA	7000-30-1900	4

WAVETEK PARTS LIST	TITLE PCA,FILTER	ASSEMBLY NO. 1100-00-0146 PAGE: 3	REV

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE FILTER BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO. 152	DWG NO 1100-00-0146 REV
	SCALE	CODE IDENT 23338	SHEET OF

DS&U BUSINESS FORMS PRINTING, INC. 2187

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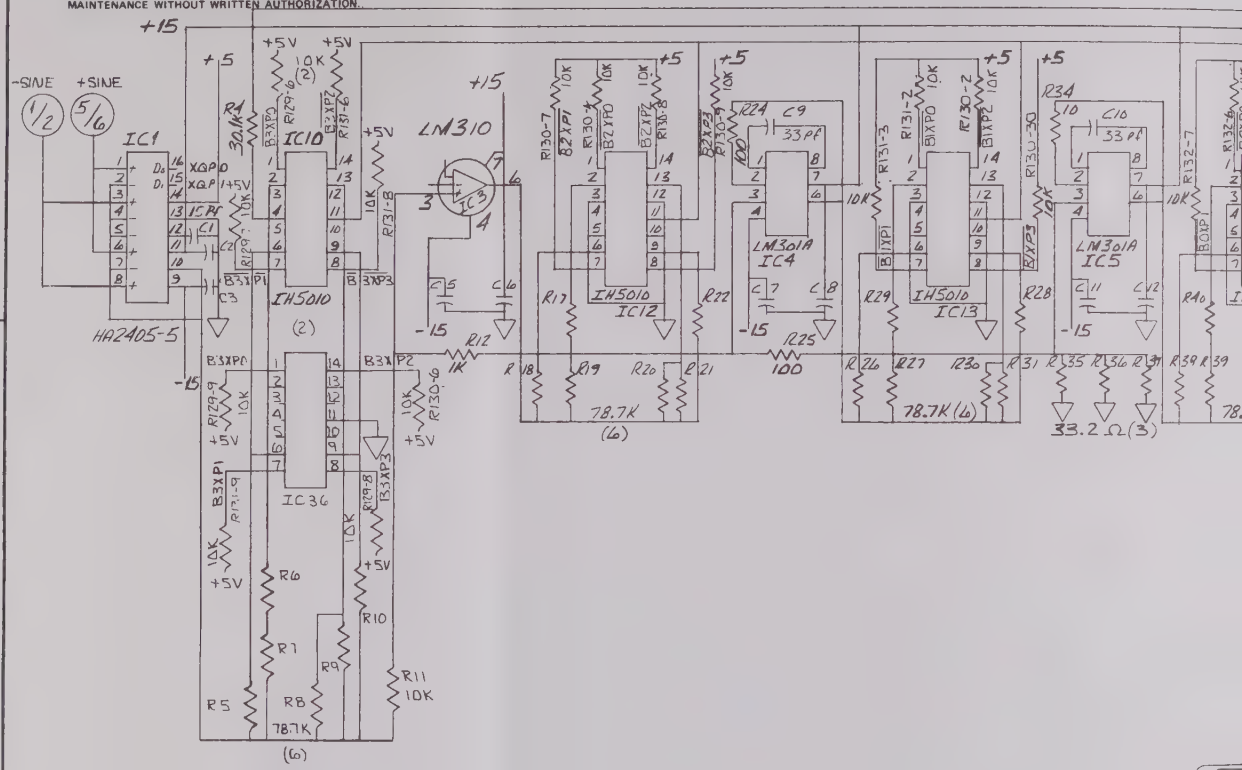
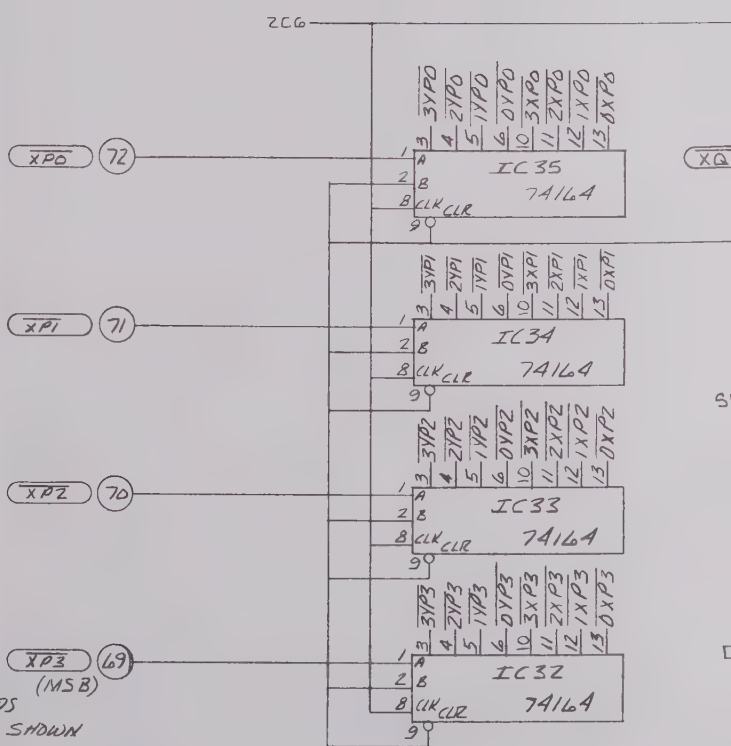




LAST REF DES USED

RES	R128
CAP	C38
IC'S	IC44

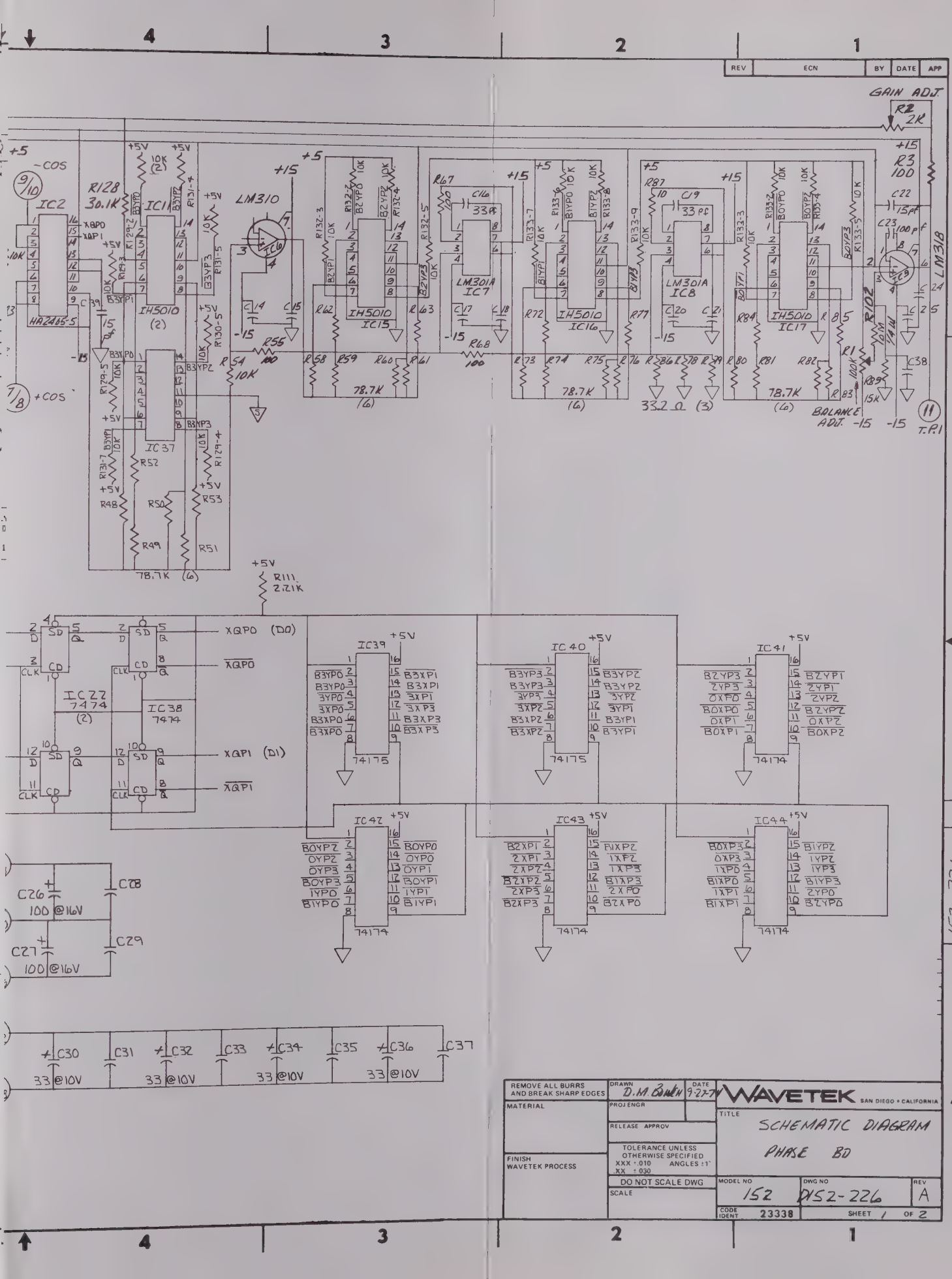
NOT USED

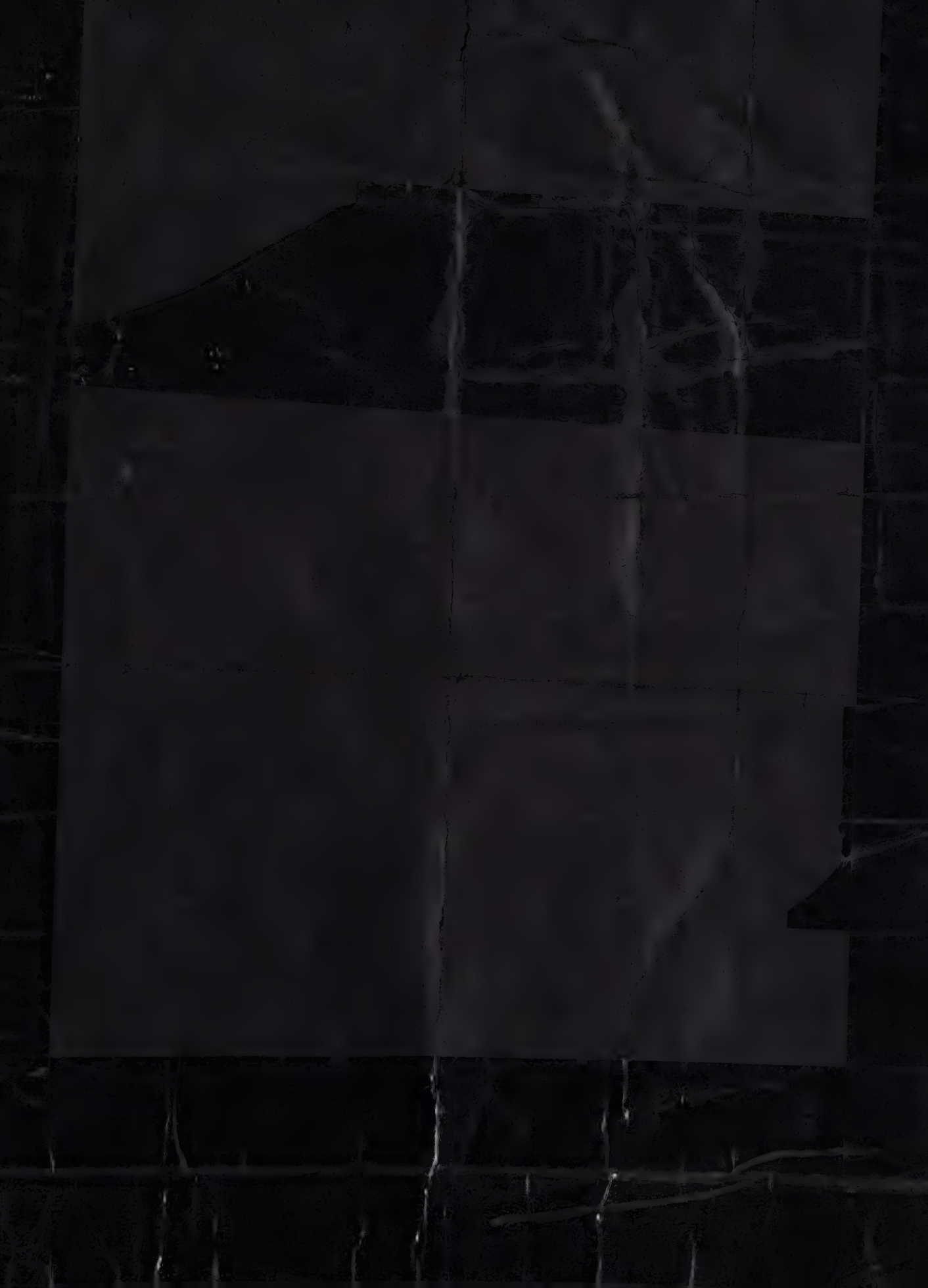
R33	R69	R97
R44	R70	R98
R45	R71	R99
R47	R88	R100
R48	R90	R101
R57	R91	R125
R64	R92	R126
R65	R93	R129
R66	R95	

2. ALL CAPACITOR VALUES ARE IN MICROFARADS & ARE .01 @ 50V EXCEPT WHERE SHOWN

1. ALL RESISTOR VALUES ARE IN OHMS(Ω)

NOTE UNLESS OTHERWISE SPECIFIED


REV
ECN
BY
DATE
APP
GAIN ADJ.
R2 2K
+5
-COS
+15
R3 100
LM318
IC2
HA2465-5
IC1
IH5010 (2)
LM310
IC6
R128 30.1K
IC37
R52
R53
R48
R49
R50
R51
78.7K (6)
R111 2.21K
IC39
IC40
IC41
74175
74174
IC27 7474 (2)
IC38 7474
XQP0 (D0)
XQP1 (D1)
IC42
IC43
IC44
C26 100 @16V
C27 100 @16V
C28
C29
C30 33 @10V
C31
C32 33 @10V
C33
C34 33 @10V
C35
C36 33 @10V
C37
IC15
IC16
IC17
LM301A IC7
LM301A IC8
R67
R72
R77
R82
R87
R62
R63
R68
R73
R74
R75
R76
R78
R79
R80
R81
R83
R84
R85
R86
33.2Ω (3)
BALANCE ADJ.
-15
T.P.1
R102
R1 100K
R89 15K
C38
152-226
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN D.M. Bowen
DATE 9-27-74
PROJ ENGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1° XX ±.030
DO NOT SCALE DWG
SCALE
WAVETEK SAN DIEGO • CALIFORNIA
TITLE SCHEMATIC DIAGRAM PHASE BD
MODEL NO 152
DWG NO 152-226
REV A
CODE IDENT 23338
SHEET 1 OF 2



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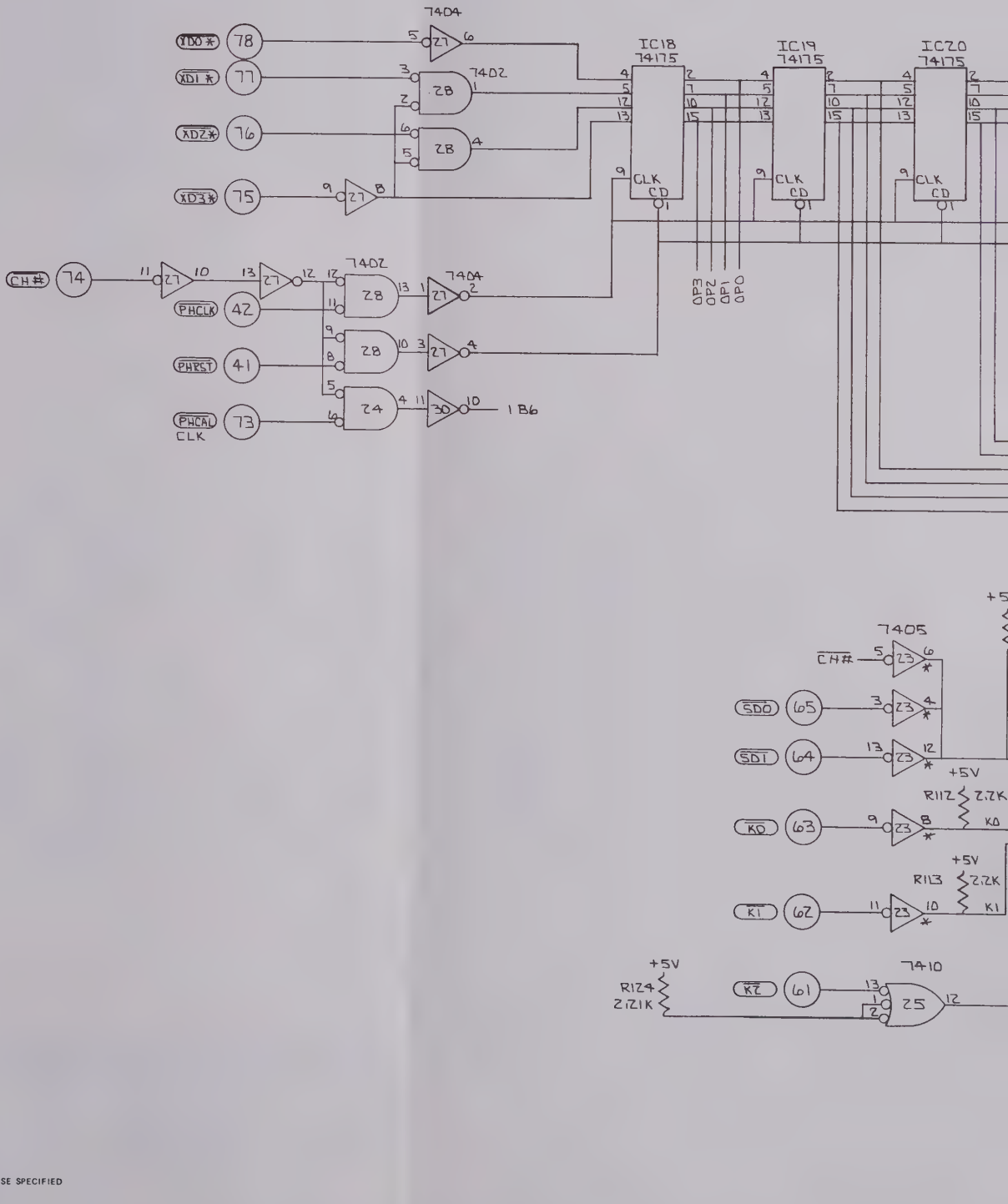
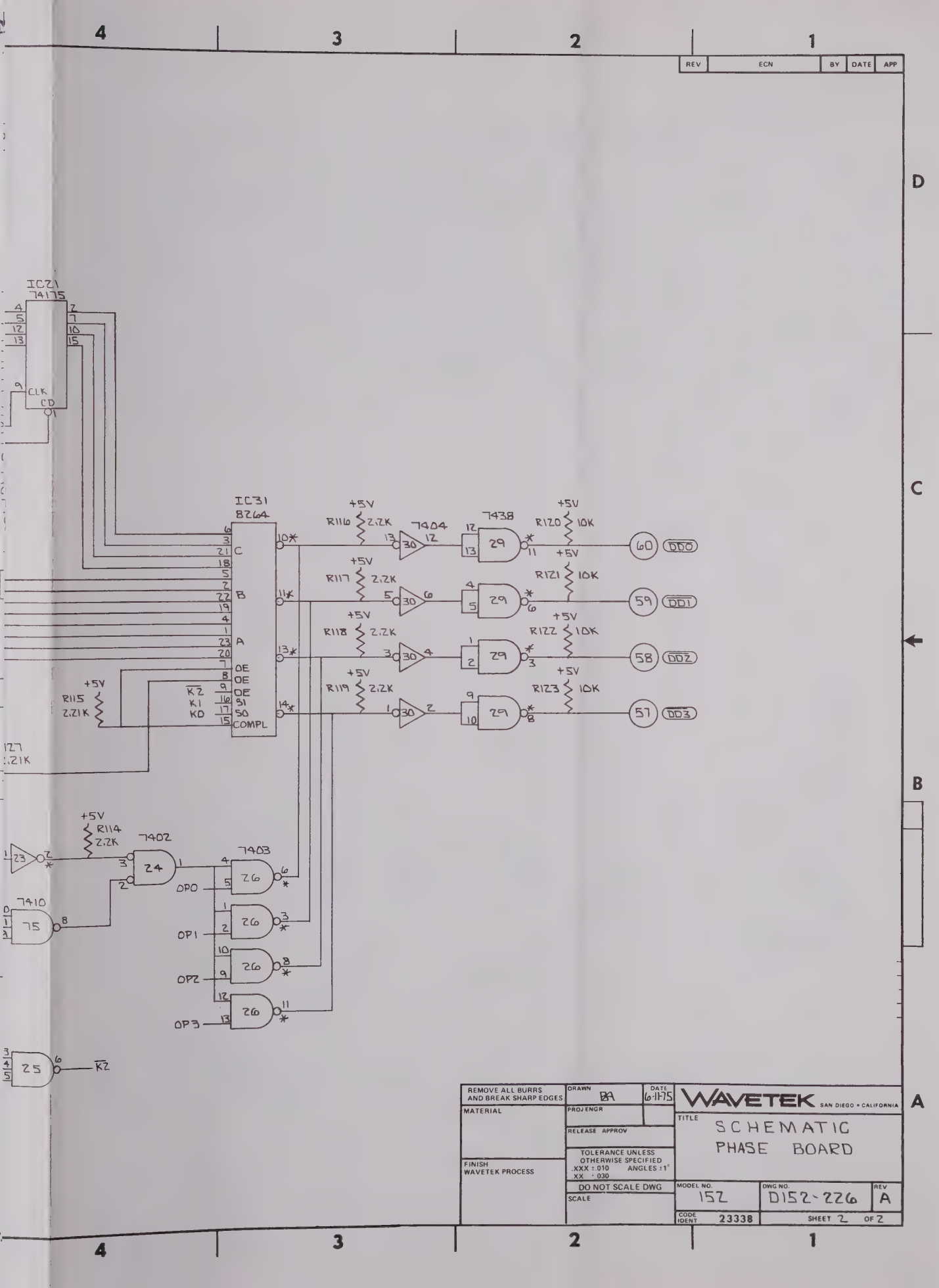


NOTE: UNLESS OTHERWISE SPECIFIED


4
3
2
1
REV
ECN
BY
DATE
APP
D
C
B
A
IC21
74175
CLK
CD
IC31
8264
C
B
A
OE
OE
OE
S1
S0
COMPL
K2
K1
KD
+5V
R115
2.21K
R116
2.2K
R117
2.2K
R118
2.2K
R119
2.2K
7404
7438
R120
10K
R121
10K
R122
10K
R123
10K
60
59
58
57
DD0
DD1
DD2
DD3
7402
7403
7410
OP0
OP1
OP2
OP3
K2
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH
WAVETEK PROCESS
DRAWN
DATE
6-1-75
PROJ ENGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED
.XXX ±.010 ANGLES ±1°
.XX ±.030
DO NOT SCALE DWG
SCALE
WAVETEK SAN DIEGO • CALIFORNIA
TITLE
SCHEMATIC
PHASE BOARD
MODEL NO.
152
DWG NO.
D152-226
REV
A
CODE IDENT
23338
SHEET 2 OF 2

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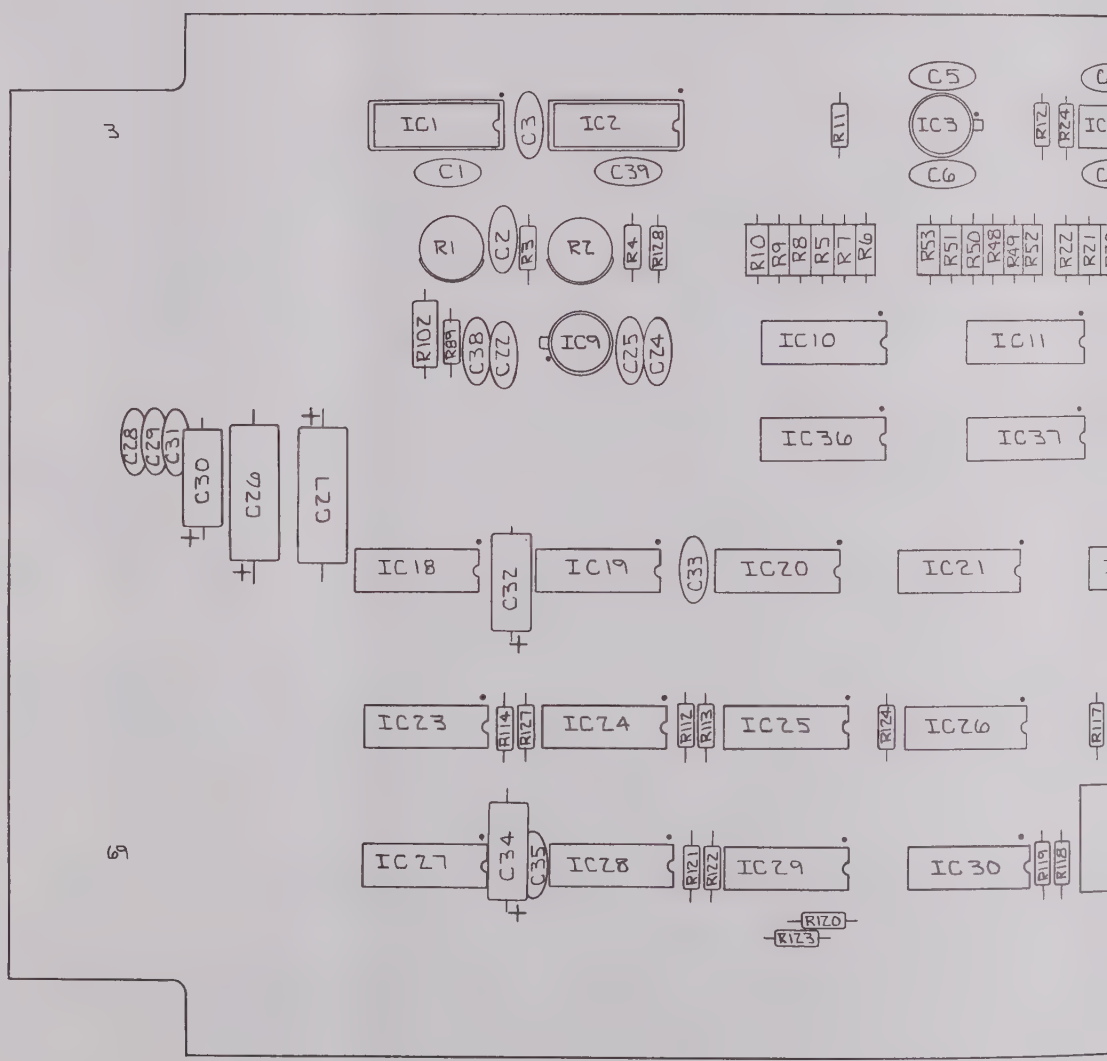
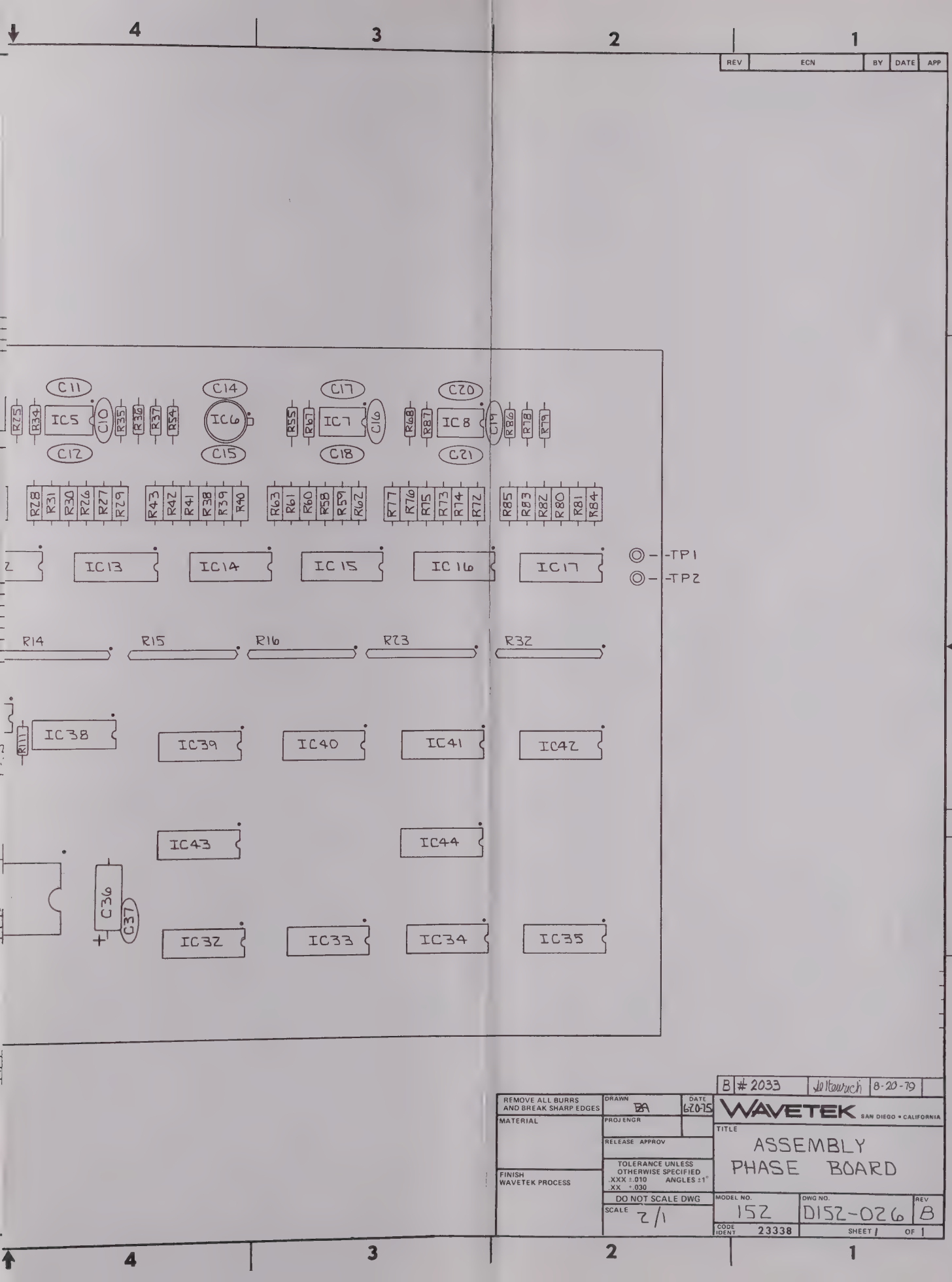


NOTE UNLESS OTHERWISE SPECIFIED


4
3
2
1
REV
ECN
BY
DATE
APP
D
C
B
A
C11
C14
C17
C20
IC5
IC6
IC7
IC8
C10
C16
C19
C12
C15
C18
C21
R25
R34
R35
R36
R37
R54
R55
R67
R68
R87
R86
R78
R79
R28
R31
R30
R26
R27
R29
R43
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R61
R60
R58
R59
R62
R77
R76
R75
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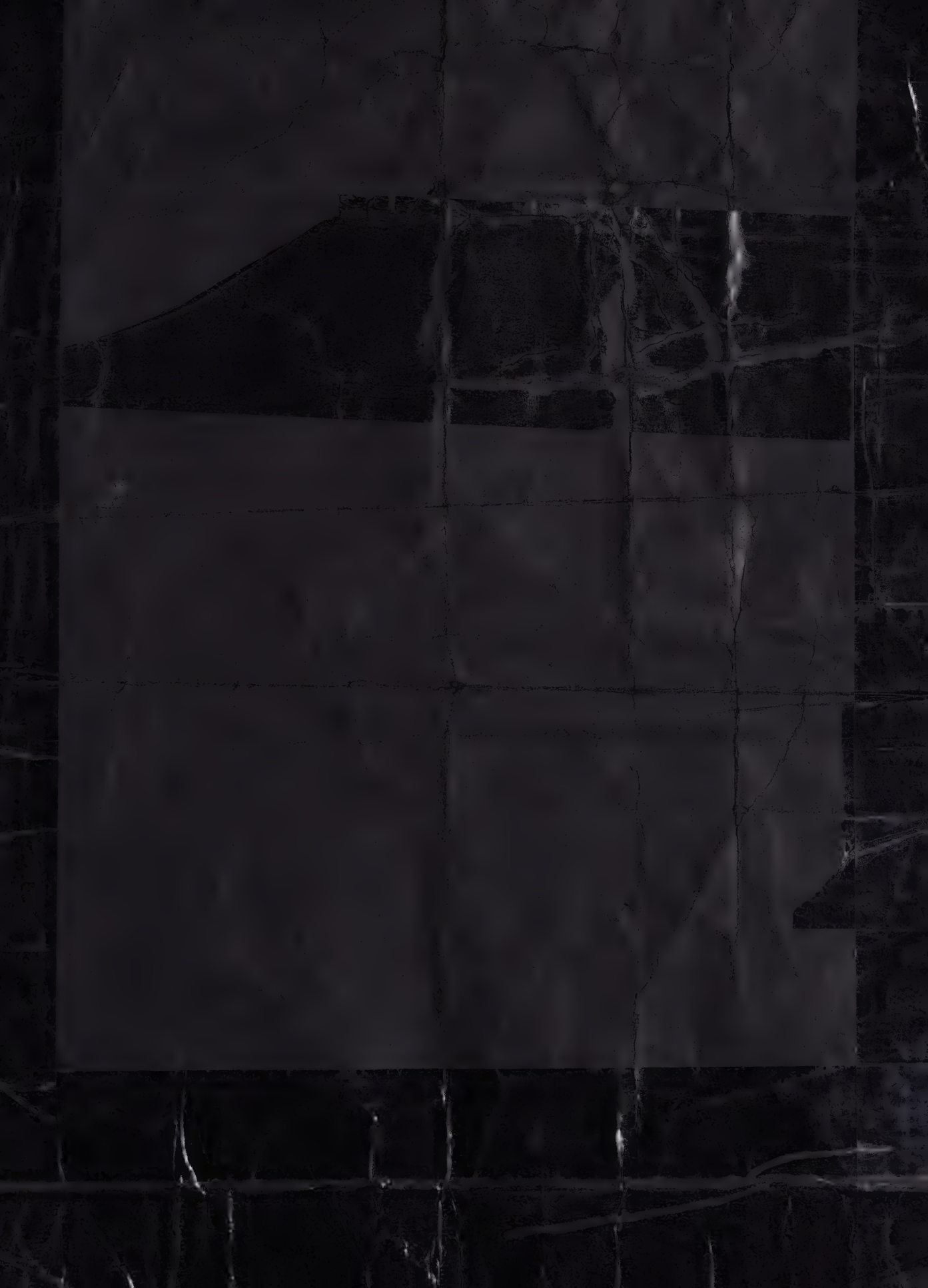
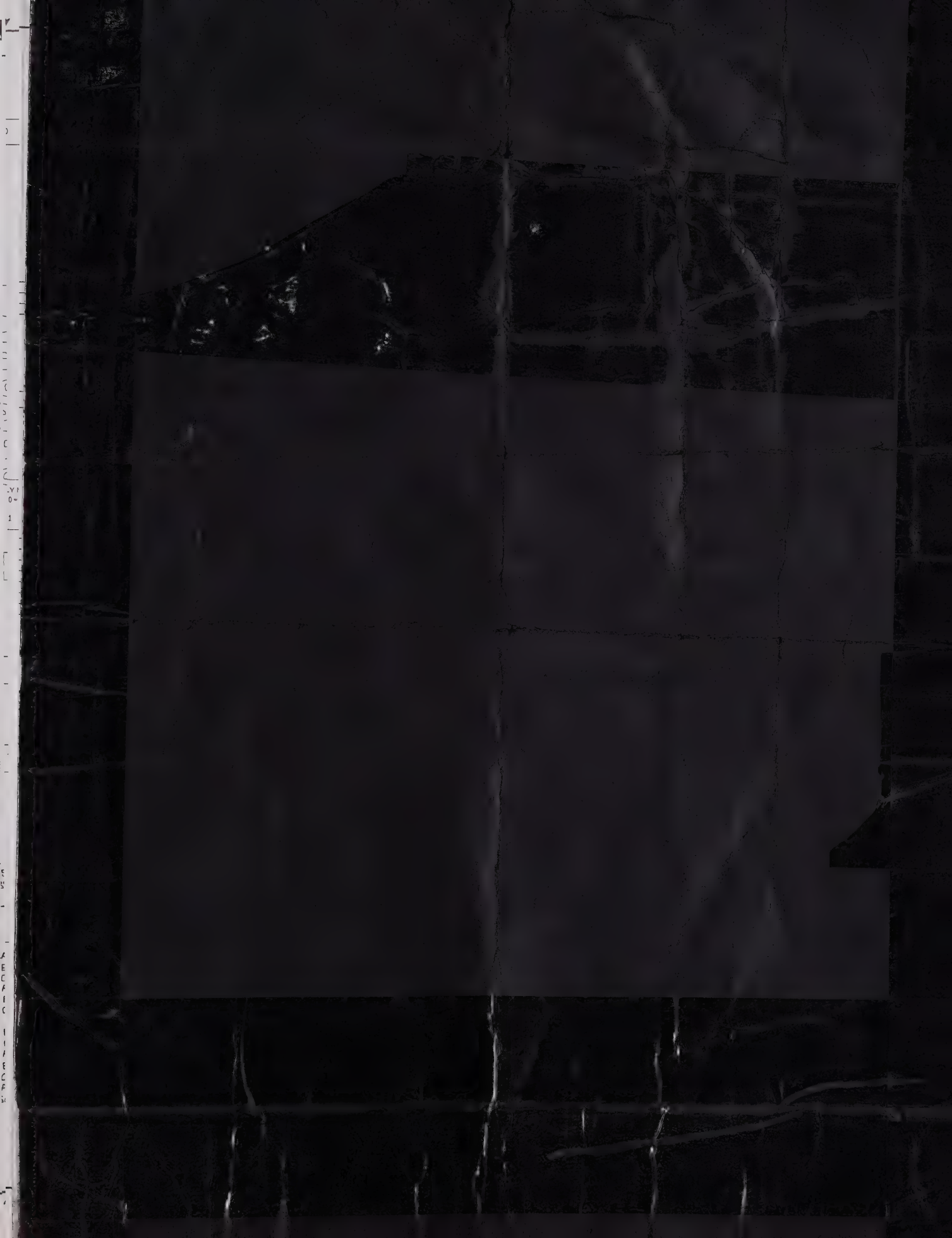
R72
R85
R83
R82
R80
R81
R84
IC13
IC14
IC15
IC16
IC17
TP1
TP2
R14
R15
R16
R23
R32
IC38
IC39
IC40
IC41
IC42
R111
IC43
IC44
C36
C37
IC32
IC33
IC34
IC35
B # 2033
8-20-79
REMOVE ALL BURRS AND BREAK SHARP EDGES
DRAWN
DATE 6-20-75
MATERIAL
PROJ ENGR
RELEASE APPROV
FINISH WAVETEK PROCESS
TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030
DO NOT SCALE DWG
SCALE 2/1
WAVETEK SAN DIEGO • CALIFORNIA
TITLE
ASSEMBLY PHASE BOARD
MODEL NO. 152
DWG NO. D152-026
REV B
CODE IDENT 23338
SHEET 1 OF 1





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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO
NONE	CAP,CER,100PF,1KV	DD-101
NONE	CAP,CER,.01MF,50V	CK-103
NONE	CAP,CER,15PF,1KV	DD-150
NONE	CAP,CER,33PF,1KV	DD-330
NONE	CAP,ELECT,100MF,16V	500D107G016DC7
NONE	CAP,TANT,33MF,10V	150D336X9010B2
NONE	PHASE BOARD	152-126
NONE	SKT,IC,16PIN	16-DIP
NONE	PIN,MALE	61182-2
NONE	POT,TRIM,100K	91AR100K
NONE	POT,TRIM,2K	91AR2K
NONE	RES,C,1/2W,5%,10M	RC20GF-106
NONE	RES,MF,1/8W,1%,100	RN55D-1000F
NONE	RES,MF,1/8W,1%,1K	RN55D-1001F
NONE	RES,MF,1/8W,1%,10K	RN55D-1002F
NONE	RES,MF,1/8W,1%,10	RN55D-10R0F
NONE	RES,MF,1/8W,1%,15K	RN55D-1502F
NONE	RES,MF,1/8W,1%,2.21K	RN55D-2211F

WAVETEK PARTS LIST	TITLE PCA,PHASE BOARD	ASSEMB 1100-0 PAGE:

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

	MFGR	WAVETEK NO.	QTY/PT
	CRL	1500-01-0111	1
	CRL	1500-01-0310	23
	CRL	1500-01-5011	3
	CRL	1500-03-3011	4
	SPRAG	1500-31-0101	2
	SPRAG	1500-73-3601	4
	WVTK	1700-00-0150	1
	CINCH	2100-03-0022	2
	AMP	2100-05-0020	4
	BECK	4600-01-0402	1
	BECK	4600-02-0201	1
	STKPL	4700-25-1005	1
	TRW	4701-03-1000	5
	TRW	4701-03-1001	2
	TRW	4701-03-1002	6
	TRW	4701-03-1009	2
	TRW	4701-03-1502	1
	TRW	4701-03-2211	11

NO.	REV
-0150	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES,MF,1/8W,1%,30.1K	RN55D-3012F	TRW	4701-03-3012	2
NONE	RES,MF,1/8W,1%,33.2	RN55D-33R2F	TRW	4701-03-3329	6
NONE	RES,MF,1/8W,1%,78.7K	RN55D-7872F	TRW	4701-03-7872	48
NONE	RES MODULE	4310R-101-103	BOURN	4770-00-0008	5
NONE	IC	LM 301AN	NSC	7000-03-0100	4
NONE	IC	7000-03-1000	WVTK	7000-03-1000	2
NONE	IC	LM318H	NSC	7000-03-1800	1
NONE	IC	HA2405-5	HARIS	7000-24-0500	2
NONE	IC	5010	INTSL	7000-50-1000	10
NONE	IC	7402	TI	8000-74-0200	2
NONE	IC	7403	TI	8000-74-0300	1
NONE	IC	7404	TI	8000-74-0400	2
NONE	IC	7405	TI	8000-74-0500	1
NONE	IC	7410	TI	8000-74-1000	1
NONE	IC	7438	TI	8000-74-3800	1
NONE	IC	7474	TI	8000-74-7400	2
NONE	IC	8264	SIG	8000-82-6400	1

WAVETEK PARTS LIST	TITLE PCA,PHASE BOARD	ASSEMBLY NO. 1100-00-0150 PAGE: 2	REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	IC	74164	TI	8007-41-6400	4
NONE	IC	74174	TI	8007-41-7400	4
NONE	IC	74175	TI	8007-41-7500	6

WAVETEK PARTS LIST	TITLE PCA,PHASE BOARD	ASSEMBLY NO. 1100-00-0150 PAGE: 3	REV

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE PHASE BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		MODEL NO. 152 / DWG NO. 1100-00-0150 / REV
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET 1 OF 1
	SCALE		

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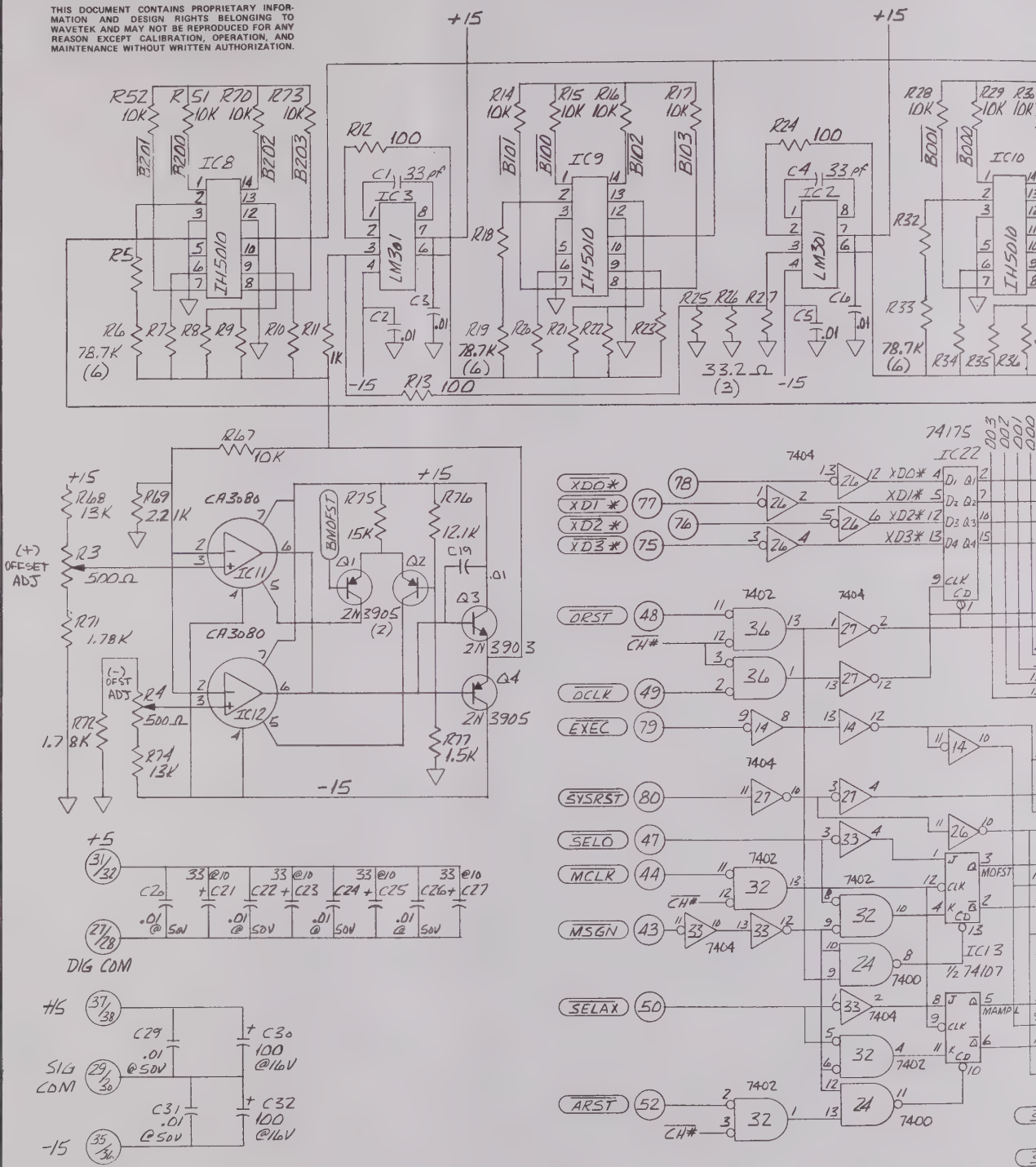
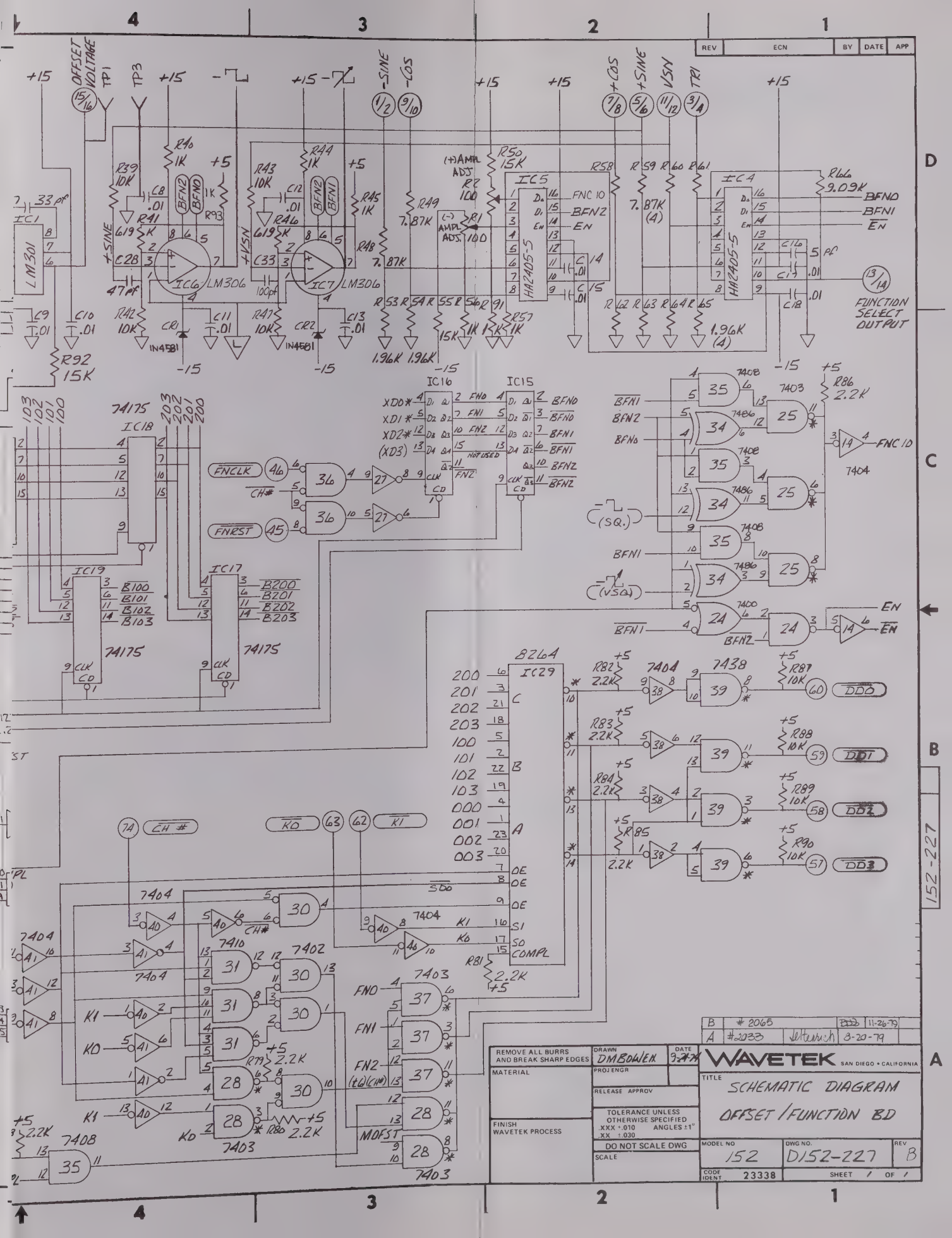


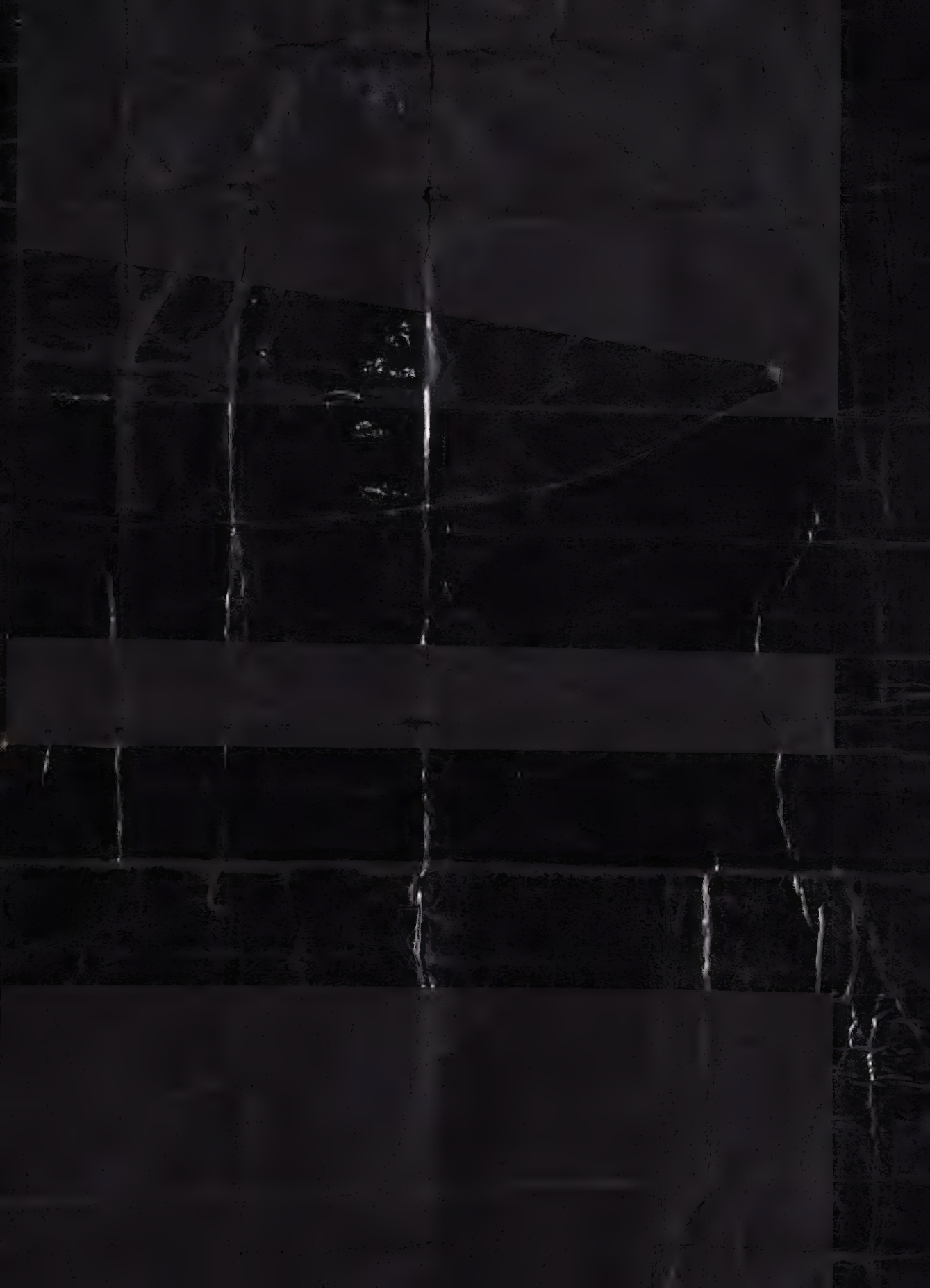
LAST REF DESIG USED	
CAP	C33
DIODE	CR2
RES	R92
INT CIR	IC40
TRAN	Q4

2. ALL CAPACITOR VALUES ARE IN MICROFARADS (μfd)
1. ALL RESISTOR VALUES ARE IN OHMS (Ω).

NOTE: UNLESS OTHERWISE SPECIFIED

FN2
FN1


REV
ECN
BY
DATE
APP
OFFSET VOLTAGE
TP1
TP3
+15
-15
+5
-SINE
-COS
+SINE
+COS
VSIN
TRI
(+)AMPL ADJ
(-) AMPL ADJ.
FUNCTION SELECT OUTPUT
LM301
LM306
HA2405-5
IN4581
74175
8264
7403
7404
7408
7410
7402
7438
WAVETEK
SAN DIEGO • CALIFORNIA
SCHEMATIC DIAGRAM
OFFSET / FUNCTION BD
MODEL NO 152
DWG NO. D152-227
REV B
CODE IDENT 23338
SHEET 1 OF 1
DRAWN DMBOWEN
DATE 9-27-79
PROJ ENGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED
.XXX ±.010 ANGLES ±1°
.XX ±.030
DO NOT SCALE DWG
SCALE
MATERIAL
FINISH WAVETEK PROCESS
REMOVE ALL BURRS AND BREAK SHARP EDGES
B # 2065 11-26-79
A #2033 8-20-79
152-227



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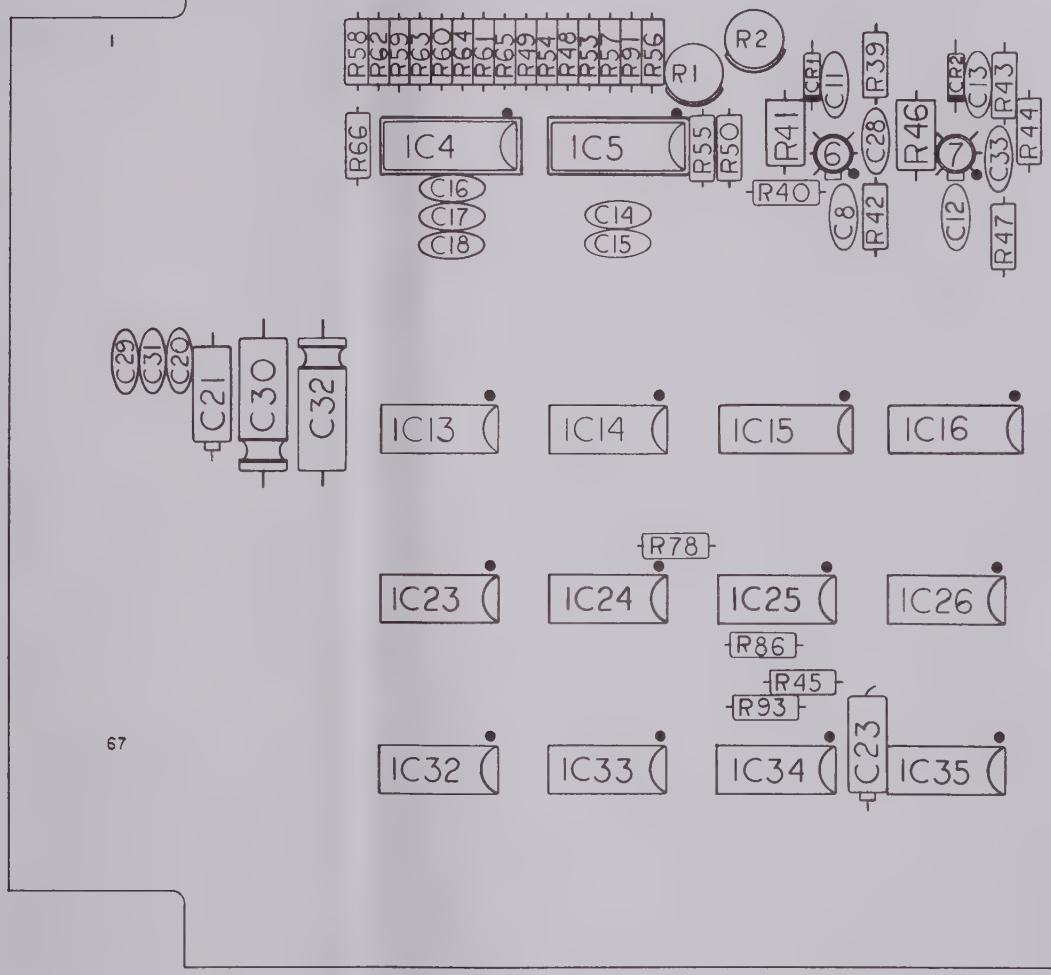
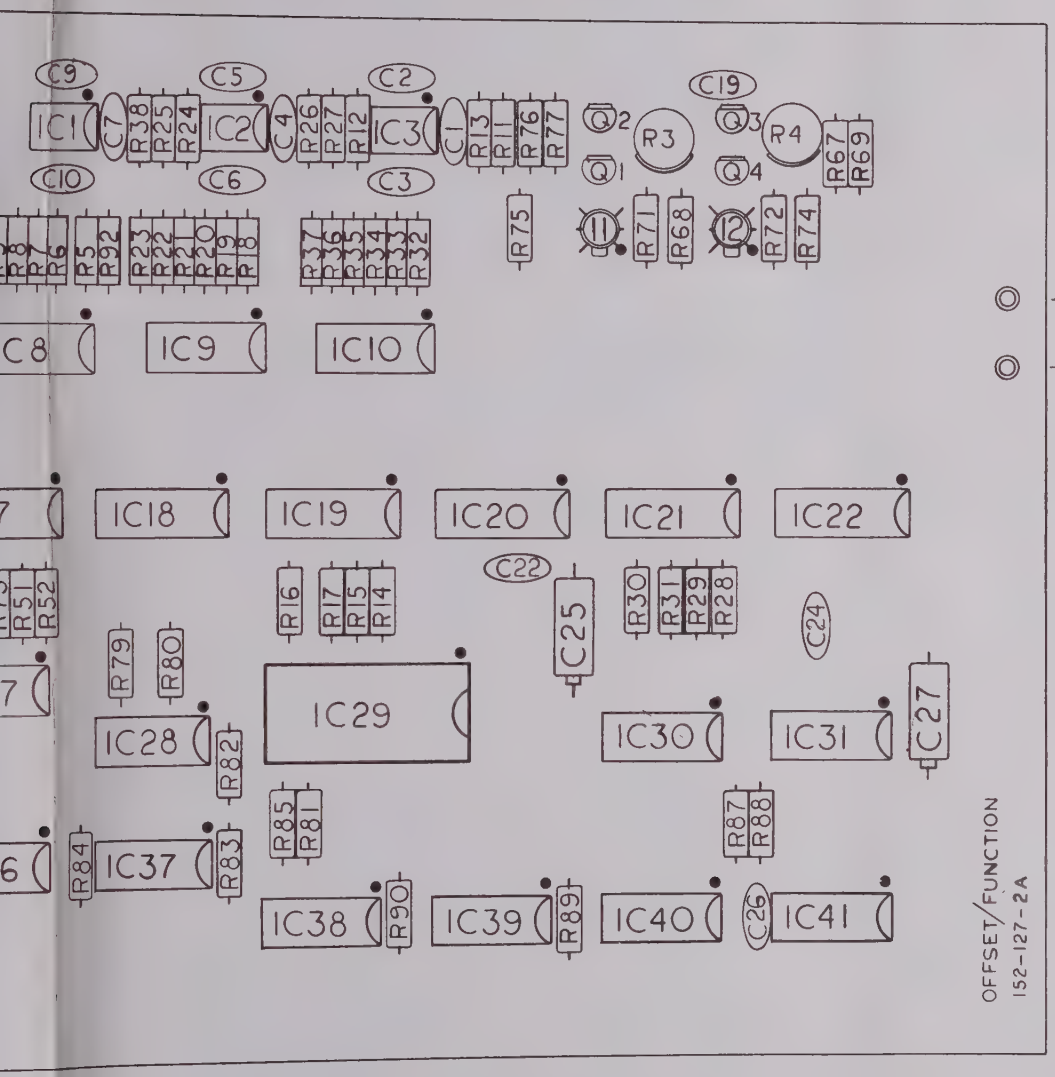


NOTE: UNLESS OTHERWISE SPECIFIED



REV	ECN	BY	DATE	APP

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE 1-21-74	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE ASSEMBLY, OFFSET FUNCTION BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ±.010 ANGLES ±1° .XX ±.030		
	DO NOT SCALE DWG	MODEL NO.	DWG NO. D152-027 REV
	SCALE	CODE IDENT 23338	SHEET OF

D152-027

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REFERENCE DESIGNATORS	PART DESCRIPTION
NONE	CAP,CER,5PF,1KV
NONE	CAP,CER,.01MF,50V
NONE	CAP,CER,33PF,1KV
NONE	CAP,CER,47PF,1KV
NONE	CAP,ELECT,100MF,16V
NONE	CAP,TANT,33MF,10V
NONE	OFFSET/FUNCTION BD
NONE	SKT,IC,16PIN
NONE	PIN,MALE
NONE	POT,TRIM,100
NONE	POT,TRIM,500
NONE	RES,MF,1/8W,1%,100
NONE	RES,MF,1/8W,1%,1K
NONE	RES,MF,1/8W,1%,10K
NONE	RES,MF,1/8W,1%,12.1K
NONE	RES,MF,1/8W,1%,13K
NONE	RES,MF,1/8W,1%,1.5K
NONE	RES,MF,1/8W,1%,15K

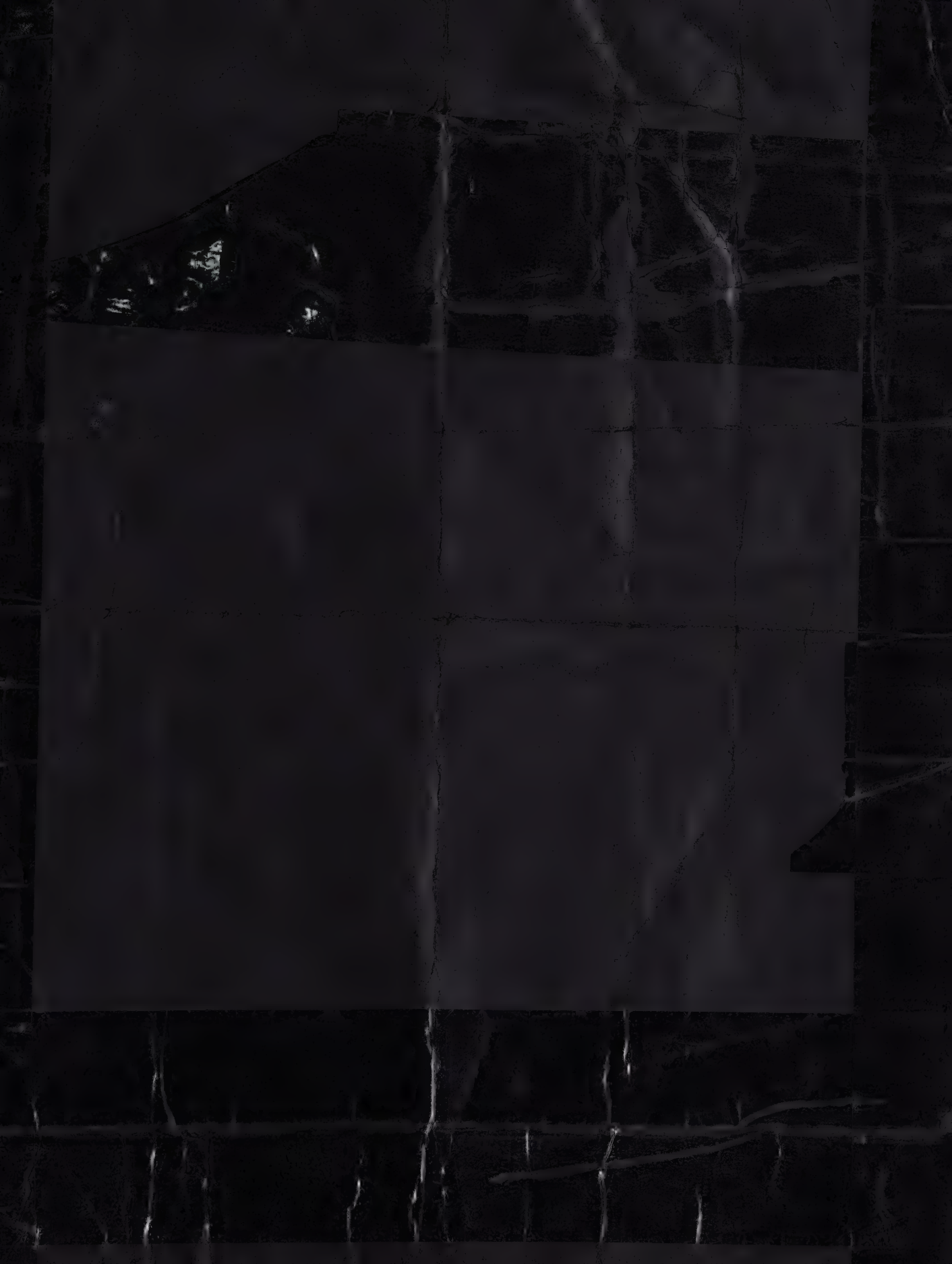
WAVETEK PARTS LIST	TITLE PCA,OFFSET/FUNCTION

REFERENCE DESIGNATORS	PART DESCRIPTION
NONE	RES,MF,1/8W,1%,1.78K
NONE	RES,MF,1/8W,1%,1.96K
NONE	RES,MF,1/8W,1%,2.21K
NONE	RES,MF,1/8W,1%,33.2
NONE	RES,MF,1/8W,1%,7.87K
NONE	RES,MF,1/8W,1%,78.7K
NONE	RES,MF,1/8W,1%,9.09K
NONE	RES,MF,1/4W,1%,619K
NONE	DIODE
NONE	TRANS
NONE	TRANS
NONE	IC
NONE	IC
NONE	IC
NONE	IC
NONE	IC
NONE	IC

WAVETEK PARTS LIST	TITLE PCA,OFFSET/FUNCTION

NOTE: UNLESS OTHERWISE SPECIFIED

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-3894



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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-
NONE	CAP,CER,5PF,1KV	DD-050
NONE	CAP,CER,.01MF,50V	CK-103
NONE	CAP,CER,33PF,1KV	DD-330
NONE	CAP,CER,47PF,1KV	DD-470
NONE	CAP,ELECT,100MF,16V	500D107G01
NONE	CAP,TANT,33MF,10V	150D336X90
NONE	OFFSET/FUNCTION BD	152-127
NONE	SKT,IC,16PIN	16-DIP
NONE	PIN,MALE	611B2-2
NONE	POT,TRIM,100	91AR100
NONE	POT,TRIM,500	91AR500
NONE	RES,MF,1/8W,1%,100	RN55D-1000
NONE	RES,MF,1/8W,1%,1K	RN55D-1001
NONE	RES,MF,1/8W,1%,10K	RN55D-1002
NONE	RES,MF,1/8W,1%,12.1K	RN55D-1212
NONE	RES,MF,1/8W,1%,13K	RN55D-1302
NONE	RES,MF,1/8W,1%,1.5K	RN55D-1501
NONE	RES,MF,1/8W,1%,15K	RN55D-1502

WAVETEK PARTS LIST — TITLE: PCA,OFFSET/FUNCTION

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-
NONE	RES,MF,1/8W,1%,1.78K	RN55D-1781
NONE	RES,MF,1/8W,1%,1.96K	RN55D-1961
NONE	RES,MF,1/8W,1%,2.21K	RN55D-2211
NONE	RES,MF,1/8W,1%,33.2	RN55D-33R2
NONE	RES,MF,1/8W,1%,7.87K	RN55D-7871
NONE	RES,MF,1/8W,1%,78.7K	RN55D-7872
NONE	RES,MF,1/8W,1%,9.09K	RN55D-9091
NONE	RES,MF,1/4W,1%,619K	RN60D-6193
NONE	DIODE	1N4841
NONE	TRANS	2N3903
NONE	TRANS	2N3905
NONE	IC	LM 301AN
NONE	IC	LM306H
NONE	IC	HA2405-5
NONE	IC	CA-3080
NONE	IC	5010
NONE	IC	7400

WAVETEK PARTS LIST — TITLE: PCA,OFFSET/FUNCTION

NOTE UNLESS OTHERWISE SPECIFIED

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-3194

REV	ECN	BY	DATE	APP

RT-NO	MFGR	WAVETEK NO.	QTY/PT
	CRL	1500-00-5011	1
	CRL	1500-01-0310	21
	ARCO	1500-03-3011	3
	ARCO	1500-04-7011	2
C7	SPRAG	1500-31-0101	2
B2	SPRAG	1500-73-3601	4
	MVTK	1700-00-0148	1
	CINCH	2100-03-0022	2
	AMP	2100-05-0020	10
	BECK	4600-01-0103	2
	BECK	4600-05-0104	2
	TRW	4701-03-1000	3
	TRW	4701-03-1001	8
	TRW	4701-03-1002	22
	TRW	4701-03-1212	1
	TRW	4701-03-1302	2
	TRW	4701-03-1501	1
	TRW	4701-03-1502	4

ASSEMBLY NO.	REV
1100-00-0148	
PAGE: 1	

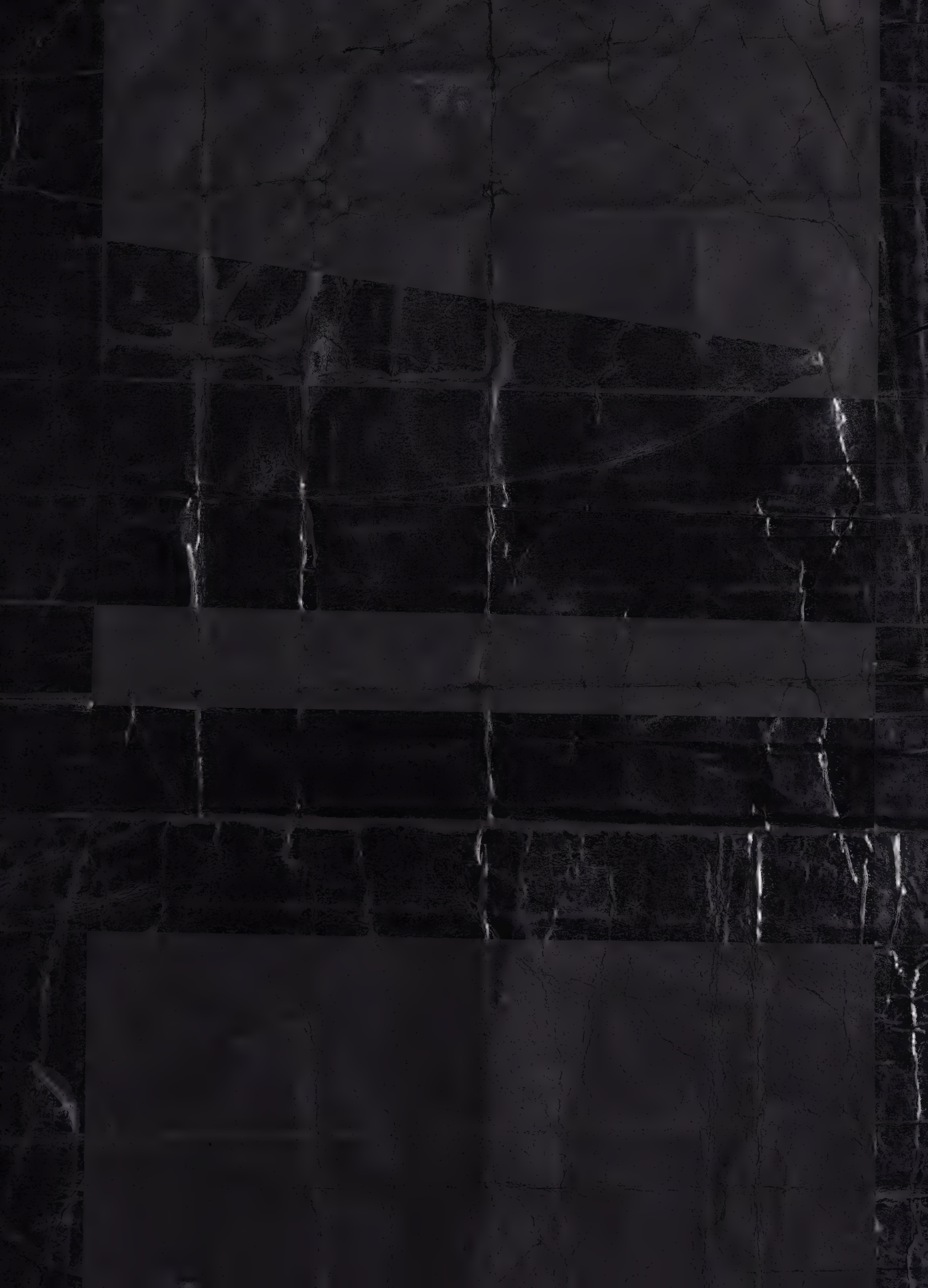
REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	IC	7402	TI	8000-74-0200	3
NONE	IC	7403	TI	8000-74-0300	3
NONE	IC	7404	TI	8000-74-0400	7
NONE	IC	7408	TI	8000-74-0800	1
NONE	IC	7410	TI	8000-74-1000	1
NONE	IC	7438	TI	8000-74-3800	1
NONE	IC	7486	TI	8000-74-8600	1
NONE	IC	8264	SIG	8000-82-6400	1
NONE	IC	74107	TI	8007-41-0700	2
NONE	IC	74175	TI	8007-41-7500	8

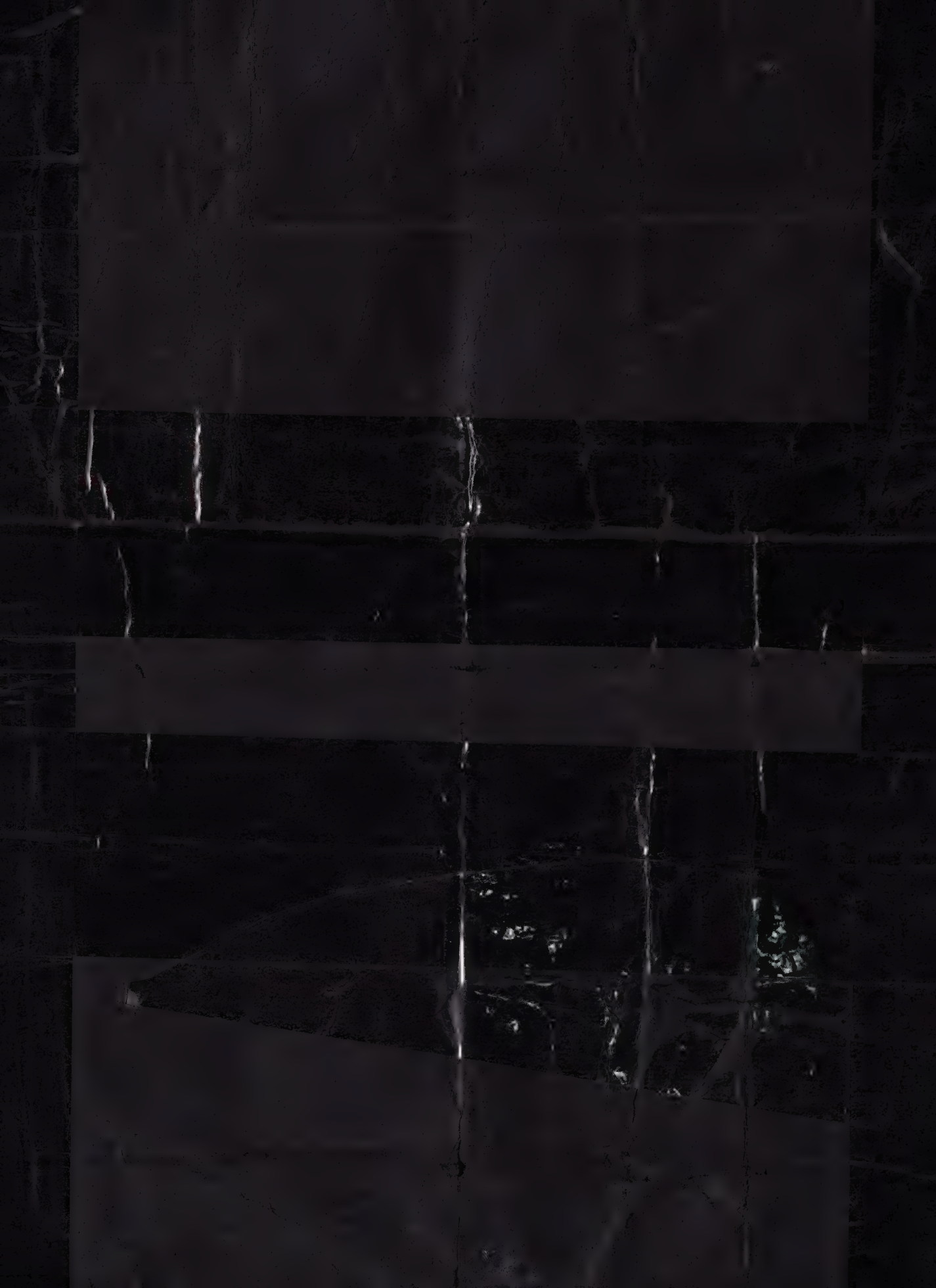
WAVETEK PARTS LIST	TITLE: PCA, OFFSET/FUNCTION	ASSEMBLY NO.: 1100-00-0148	REV
		PAGE: 3	

RT-NO	MFGR	WAVETEK NO.	QTY/PT
	TRW	4701-03-1781	2
	TRW	4701-03-1961	6
	TRW	4701-03-2211	10
	TRW	4701-03-3329	3
	TRW	4701-03-7871	6
	TRW	4701-03-7872	18
	TRW	4701-03-9091	1
	TRW	4701-13-6193	2
	MICRO	4801-01-4581	2
	NSC	4901-03-9030	1
	ITT	4901-03-9050	3
	NSC	7000-03-0100	3
	NSC	7000-03-0600	2
	HARIS	7000-24-0500	2
	RCA	7000-30-8000	2
	INTSL	7000-50-1000	3
	TI	8000-74-0000	1

ASSEMBLY NO.	REV
1100-00-0148	
PAGE: 2	

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: PARTS LIST OFFSET/FUNCTION BOARD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED .XXX ± .010 ANGLES ± 1 XX ± .030		MODEL NO: 152
	DO NOT SCALE DWG		DWG NO: 1100-00-0148
	SCALE		REV: -
			CODE IDENT: 23338
			SHEET 1 OF 1





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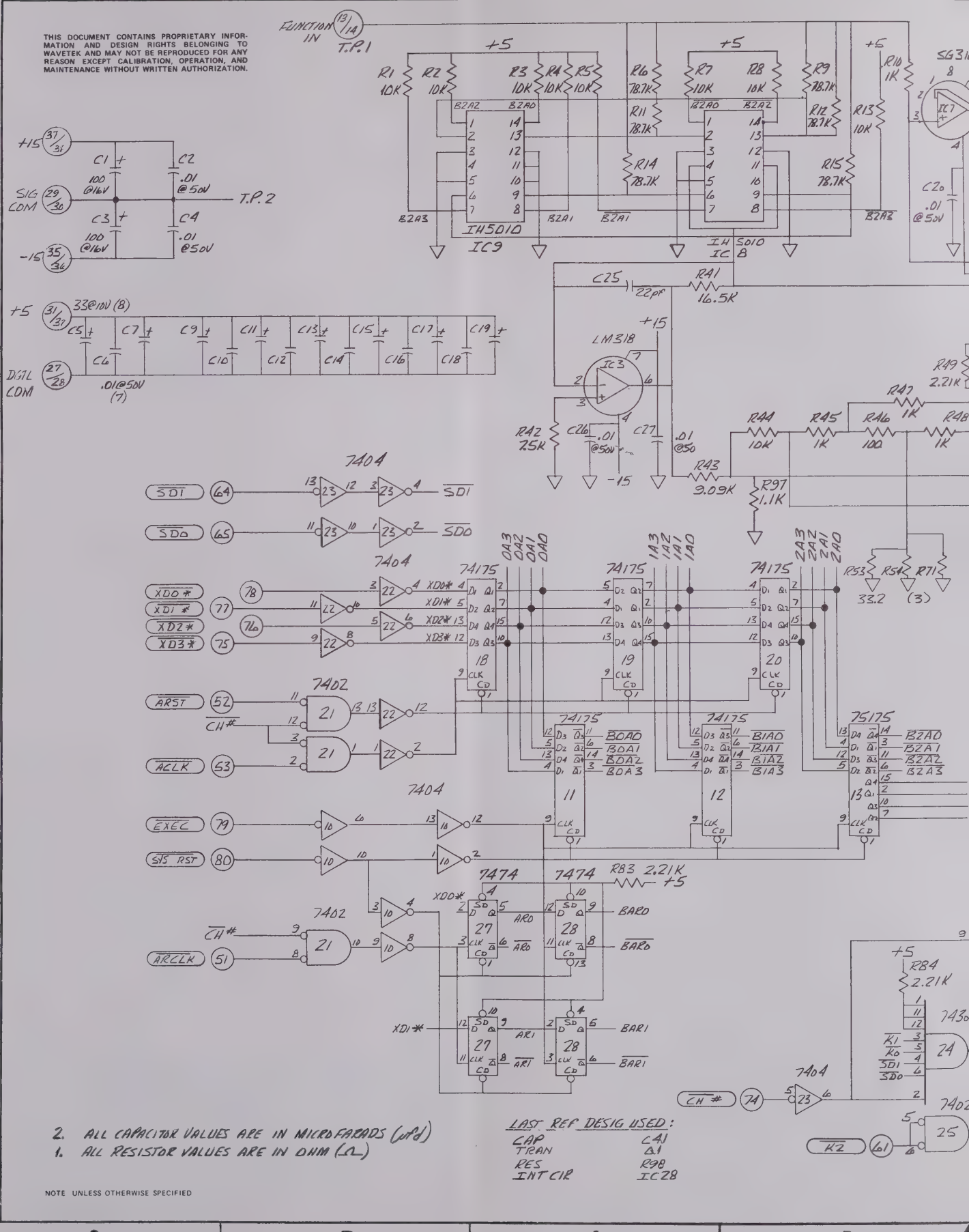

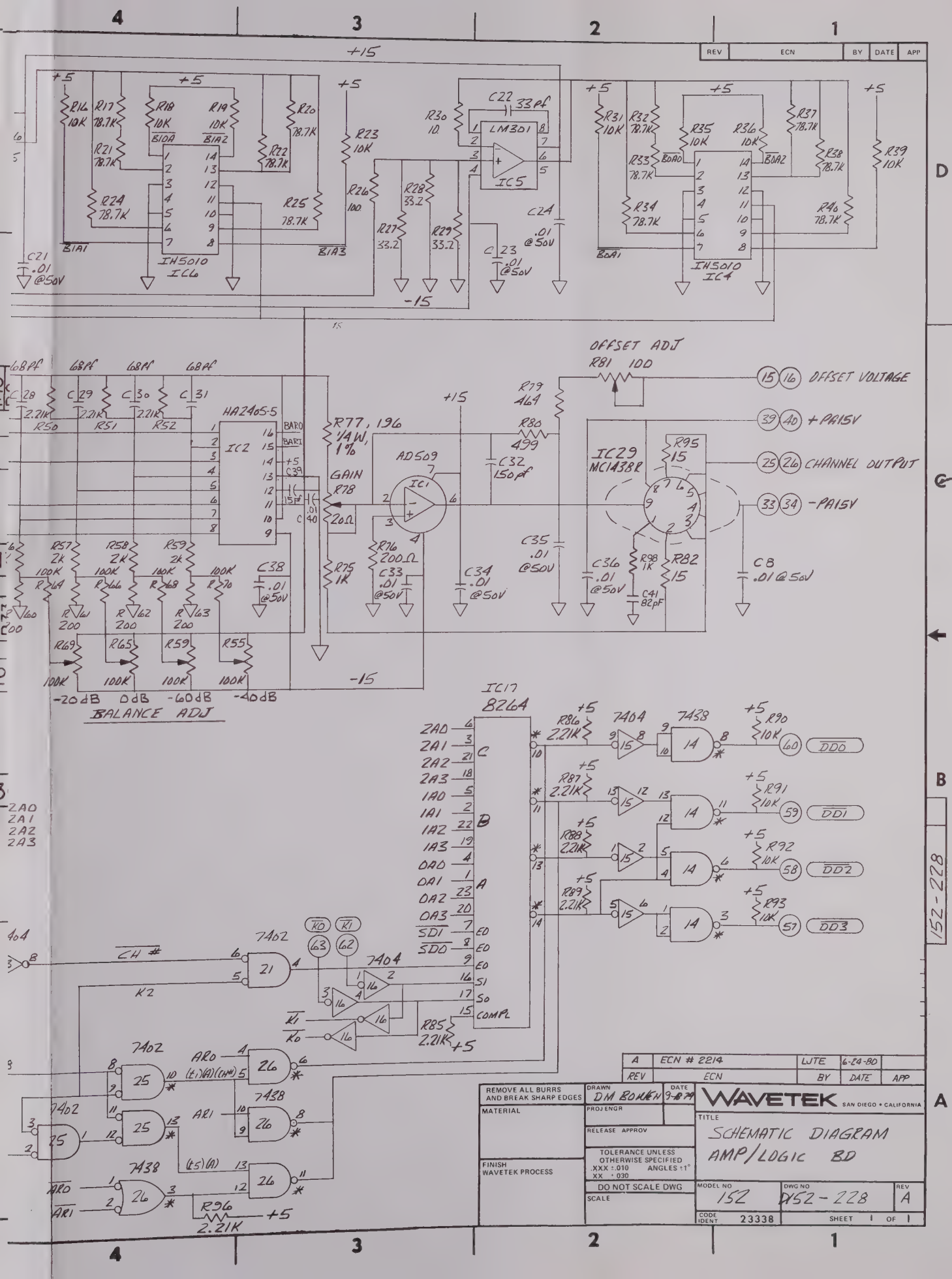
REV ECN BY DATE APP
+15
-15
+5
R16 10K
R17 78.7K
R18 10K
R19 10K
R20 78.7K
R21 78.7K
R22 78.7K
R23 10K
R24 78.7K
R25 78.7K
R26 100
R27 33.2
R28 33.2
R29 33.2
R30 10
C22 33pf
LM301
IC5
C21 .01 @50V
C23 .01 @50V
C24 .01 @50V
B1A0
B1A1
B1A2
B1A3
IH5010 IC6
R31 10K
R32 78.7K
R33 78.7K
R34 78.7K
R35 10K
R36 10K
R37 78.7K
R38 78.7K
R39 10K
R40 78.7K
B0A0
B0A1
B0A2
IH5010 IC4
OFFSET ADJ
R81 10D
OFFSET VOLTAGE
+PA15V
CHANNEL OUTPUT
-PA15V
IC29 MC1438L
R95 15
R98 1K
R82 15
C8 .01 @50V
C35 .01 @50V
C36 .01 @50V
C41 82pF
R79 464
R80 499
C32 150pf
AD509
IC1
GAIN
R78 20Ω
R76 200Ω
C33 .01 @50V
C34 .01 @50V
R75 1K
R77, 196 1/4W, 1%
C38 .01 @50V
HA2405-5
IC2
C28 68pf 2.21K R50
C29 68pf 2.21K R51
C30 68pf 2.21K R52
C31 68pf
R57 2K 100K R64
R58 2K 100K R66
R59 2K 100K R68
100K R70
R60 200
R61 200
R62 200
R63 200
R69 100K
R65 100K
R59 100K
R55 100K
-20dB 0dB -60dB -40dB
BALANCE ADJ
IC17 8264
ZA0 ZA1 ZA2 ZA3 IA0 IA1 IA2 IA3 OA0 OA1 OA2 OA3 SDI SDO ED ED ED SI SO COMP
R86 2.21K
R87 2.21K
R88 2.21K
R89 2.21K
R85 2.21K
R90 10K
R91 10K
R92 10K
R93 10K
7404
7438
7402
DD0
DD1
DD2
DD3
CH #
K2
K1
K0
ARO
ARI
R96 2.21K
A ECN # 2214 LJTE 6-24-80
REMOVE ALL BURRS AND BREAK SHARP EDGES
MATERIAL
FINISH WAVETEK PROCESS
DRAWN DM BOWEN 9-8-79
PROJ ENGR
RELEASE APPROV
TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1° XX .030
DO NOT SCALE DWG
SCALE
WAVETEK SAN DIEGO • CALIFORNIA
TITLE SCHEMATIC DIAGRAM AMP/LOGIC BD
MODEL NO 152
DWG NO D152-228
REV A
CODE IDENT 23338
SHEET 1 OF 1
152-228

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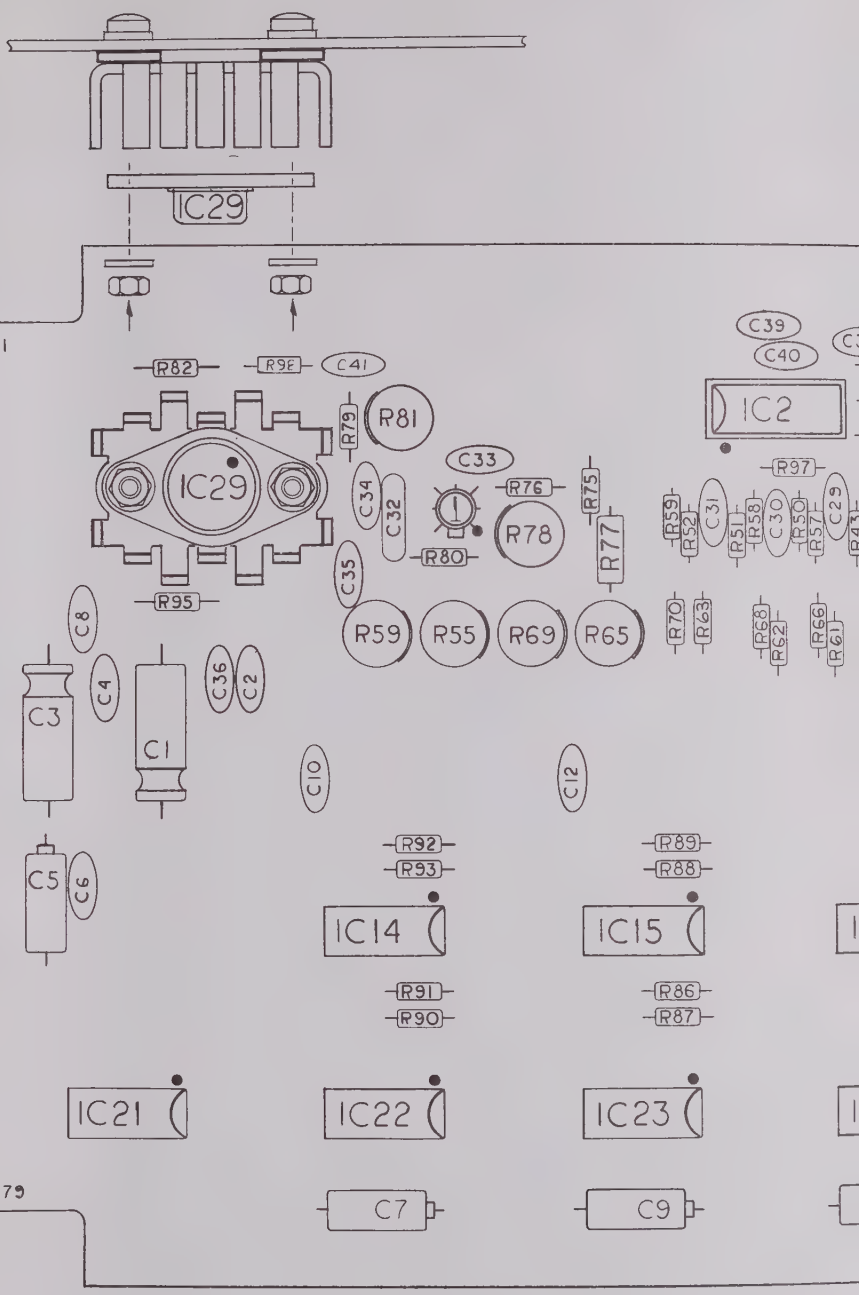
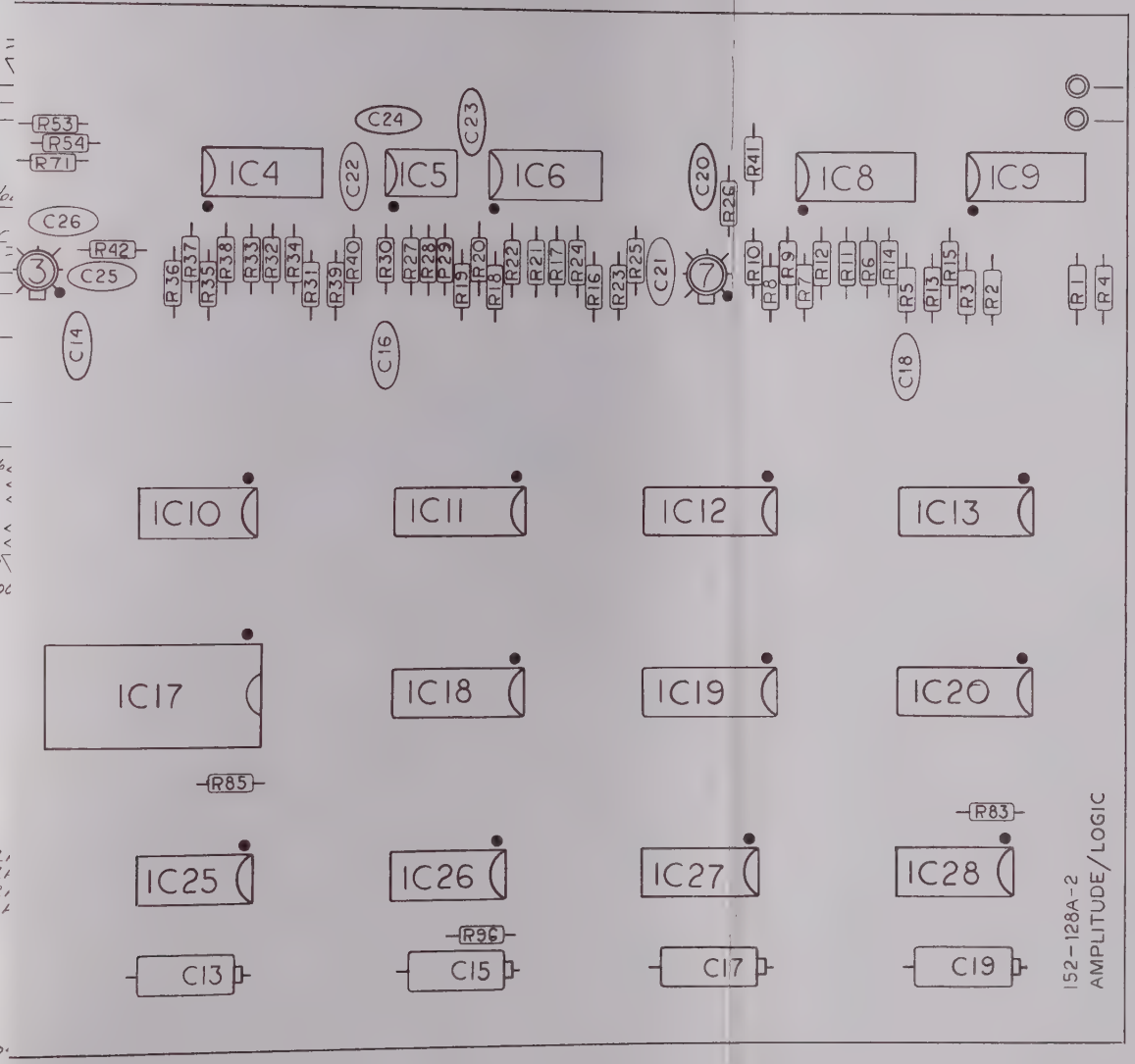


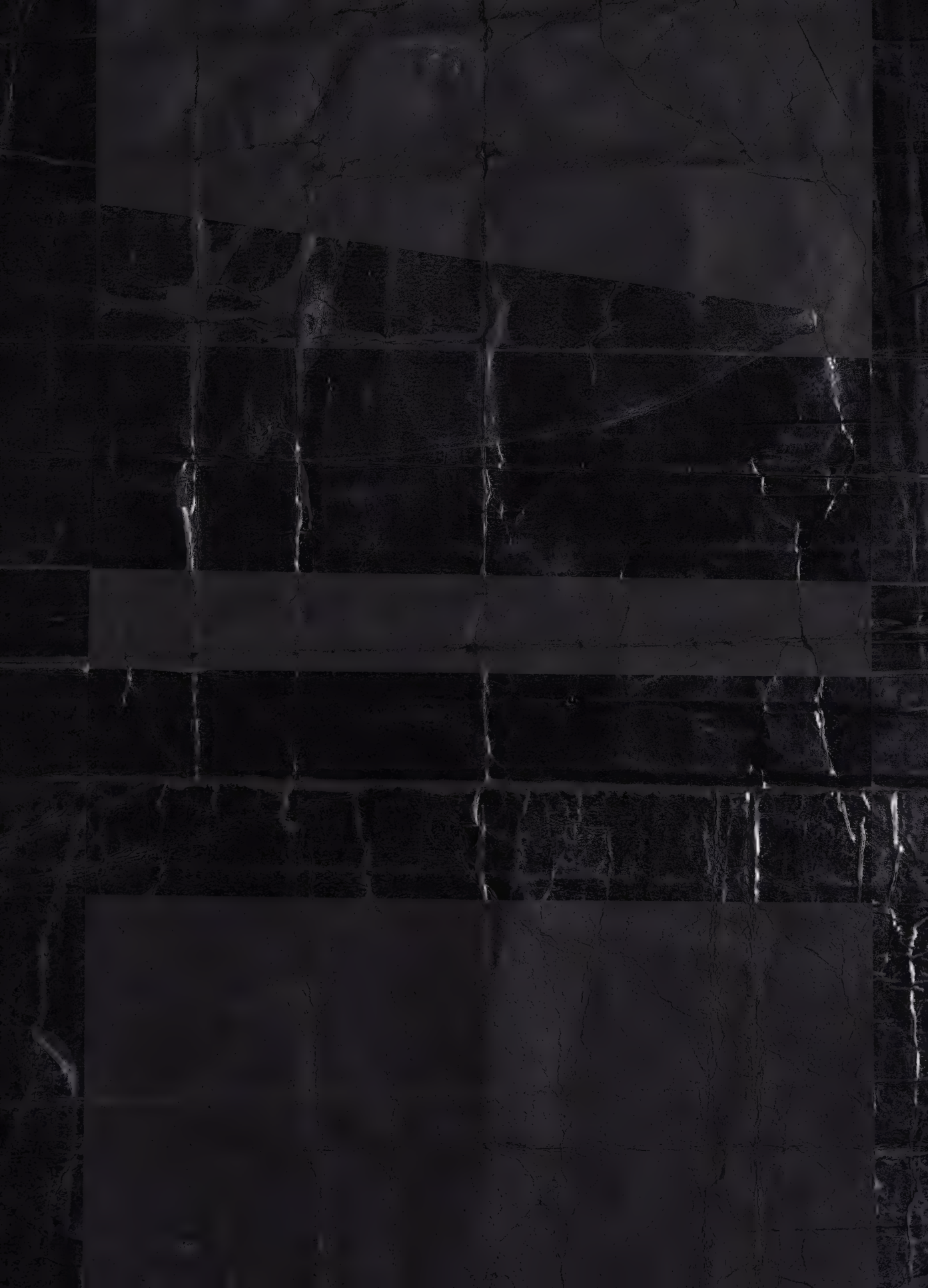
NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP
A	ECN # 2214	LJTE	6-24-80	



REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN HHG 1-21-75	WAVETEK SAN DIEGO • CALIFORNIA	
MATERIAL	PROJ ENGR	TITLE ASSEMBLY, AMPLITUDE/LOGIC	
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ± .010 ANGLES ±1° XX ± .030	MODEL NO	DWG NO D152-028 REV A
	DO NOT SCALE DWG	CODE IDENT 23338	SHEET OF
	SCALE		

D152-028



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REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PA
NONE	HEATSINK,MOD FROM:2800-11-0010	152-326
NONE	CAP,CER,.01MF,50V	CK-103 LONG
NONE	CAP,CER,15PF,1KV	DD-150
NONE	CAP,CER,22PF,1KV	DD-220 LONG
NONE	CAP,CER,33PF,1KV	DD-330 LONG
NONE	CAP,CER,68PF,1KV	DD-680
NONE	CAP,MICA,150PF,500V	DM15-151J
NONE	CAP,ELECT,100MF,16V	500D107G016D
NONE	CAP,TANT,33MF,10V	150D336X9010
NONE	AMP/LOGIC BOARD	152-12[illegible]
NONE	SKT,IC,16PIN	16-DIP
NONE	PIN,MALE	61182-2
NONE	POT,TRIM,100	91AR100
NONE	POT,TRIM,100K	91AR100K
NONE	POT,TRIM,20	91AR20
NONE	RES,MF,1/8W,1%,100	RN55D-1000F
NONE	RES,MF,1/8W,1%,1K	RN55D-1001F

WAVETEK PARTS LIST

TITLE
PCA,AMP/LOGIC

NOTE: UNLESS OTHERWISE SPECIFIED

REV	ECN	BY	DATE	APP

MFGR	WAVETEK NO.	QTY/PT
WVTK	1400-00-8669	1
CRL	1500-01-0300	21
CRL	1500-01-5011	1
CRL	1500-02-2001	1
CRL	1500-03-3001	1
CRL	1500-06-8001	4
ARCO	1500-11-5100	1
SPRAG	1500-31-0101	2
SPRAG	1500-73-3601	8
WVTK	1700-00-0147	1
CINCH	2100-03-0022	1
AMP	2100-05-0020	2
BECK	4600-01-0103	1
BECK	4600-01-0402	4
BECK	4600-02-0000	1
TRW	4701-03-1000	2
TRW	4701-03-1001	5

ASSEMBLY NO.	REV
-00-0147	
1	

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	RES,MF,1/8W,1%,10K	RN55D-1002F	TRW	4701-03-1002	21
NONE	RES,MF,1/8W,1%,100K	RN55D-1003F	TRW	4701-03-1003	4
NONE	RES,MF,1/8W,1%,10	RN55D-10R0F	TRW	4701-03-1009	1
NONE	RES,MF,1/8W,1%,1.1K	RN55D-1101F	TRW	4701-03-1101	1
NONE	RES,MF,1/8W,1%,15	RN55D-15R0F	TRW	4701-03-1509	2
NONE	RES,MF,1/8W,1%,16.5K	RN55D-1652F	TRW	4701-03-1652	1
NONE	RES,MF,1/8W,1%,200	RN55D-2000F	TRW	4701-03-2000	5
NONE	RES,MF,1/8W,1%,2K	RN55D-2001F	TRW	4701-03-2001	4
NONE	RES,MF,1/8W,1%,2.21K	RN55D-2211F	TRW	4701-03-2211	12
NONE	RES,MF,1/8W,1%,33.2	RN55D-33R2F	TRW	4701-03-3329	6
NONE	RES,MF,1/8W,1%,464	RN55D-4640F	TRW	4701-03-4640	1
NONE	RES,MF,1/8,1%,499	RN55D-4990F	TRW	4701-03-4990	1
NONE	RES,MF,1/8W,1%,7.5K	RN55D-7501F	TRW	4701-03-7501	1
NONE	RES,MF,1/8W,1%,78.7K	RN55D-7872F	TRW	4701-03-7872	18
NONE	RES,MF,1/8W,1%,9.09K	RN55D-9091F	TRW	4701-03-9091	1
NONE	RES,MF,1/4W,1%,196	RN60D-1960F	TRW	4701-13-1960	1
NONE	IC	LM 301AN	NSC	7000-03-0100	1

WAVETEK PARTS LIST	TITLE PCA,AMP/LOGIC	ASSEMBLY NO. 1100-00-0147 PAGE: 2	REV

REFERENCE DESIGNATORS	PART DESCRIPTION	ORIG-MFGR-PART-NO	MFGR	WAVETEK NO.	QTY/PT
NONE	IC	7000-03-1000	WVTK	7000-03-1000	1
NONE	IC	LM318H	NSC	7000-03-1800	1
NONE	IC	AD509JH	ANADV	7000-05-0900	1
NONE	IC	MC1438R	MOT	7000-14-3800	1
NONE	IC	HA2405-5	HARIS	7000-24-0500	1
NONE	IC	5010	INTSL	7000-50-1000	4
NONE	IC	7402	TI	8000-74-0200	2
NONE	IC	7404	TI	8000-74-0400	5
NONE	IC	7430	TI	8000-74-3000	1
NONE	IC	7438	TI	8000-74-3800	2
NONE	IC	7474	TI	8000-74-7400	2
NONE	IC	8264	SIG	8000-82-6400	1
NONE	IC	74175	TI	8007-41-7500	6

WAVETEK PARTS LIST	TITLE PCA,AMP/LOGIC	ASSEMBLY NO. 1100-00-0147 PAGE: 3	REV

REMOVE ALL BURRS AND BREAK SHARP EDGES	DRAWN	DATE	WAVETEK SAN DIEGO • CALIFORNIA
MATERIAL	PROJ ENGR		TITLE: AMPLITUDE BD
	RELEASE APPROV		
FINISH WAVETEK PROCESS	TOLERANCE UNLESS OTHERWISE SPECIFIED XXX ±.010 ANGLES ±1° XX ±.030		MODEL NO. 152 / DWG NO. 1100-00-0147 / REV
	DO NOT SCALE DWG		CODE IDENT 23338 / SHEET 1 OF 1
	SCALE		

APPENDIX A

ADVANCED PROGRAMMING

The Model 152 will accept standard format statements such as:

WRITE (10,700) NU, A, F, O, M, NFUNC

700 FORMAT ("G", I1, "A", E12.2, "F", E12.2, "D", F6.2, "B", I1, "C", I1, "I")

Where	NU	is unit number
	A	is amplitude value
	F	is frequency value
	O	is offset value
	M	is mode number
	NFUNC	is function code

and literals in quotations are defined in figure 3-1.

For example, the Model 152 would first be sent an ASCII "G" followed by the integer value stored at "NU". The trailing ASCII "I" is the group execute of the generator.

Note that the amplitude or frequency values will be sent to the instrument exactly as they would to a printer; for example, the value 123:

A^^^^1.23^^02

That is, a field 12 characters wide with 2 characters to the right of the decimal point. However, some systems would output:

A^^^^.12E^^03

for the same E12.2 field, and some systems allow formats of the type: 1PE 12.2 which yield:

A^^^^1.23E^02

for the value 123.

If the 1P modifyer is not available, the value can be divided by 10 to decrease the exponent. If the value in variable "F" were 123,450 (Hz), for example, it could be formatted as:

("F", E12.3) or (1HF, E12.3)

The result would be a value of 0.12345E6/10 or .12345E5. This would be sent as:

F^^^^.123^05

The Model 152 would ignore the decimal and place it between the 1 and the 2 resulting in a frequency of 1.23 5 or 123,000 Hz.

Whatever the case, the output must be properly scaled by noting that the instrument retains the last three value digits and ignores previous digits and decimal points in the value field. Similarily, it accepts only the last exponent digit and ignores exponent signs. The exception is phase which retains the last four value digits, places a decimal between the third and fourth, and has no exponent.

Amplitudes are accepted as a three digit value X.XX along with a range digit. The most significant digit can range from 0 to 9 and the decimal is put between the first and second digits. A range digit is always accepted as a negative exponent (divider); a zero for no attenuation, a -1 for 1/10 and a -2 for 1/100 of the output. A computed range digit of +1 would be accepted as a -1, therefore do not attempt to send A0.123E+01.

Offset accepts a three digit value X.XX which ranges from 0.00 to ±9.99Vdc. Offset is not attenuated and does not accept a range digit.

Frequency is programmed with the same value fields as amplitude. The most significant digit can range from 1 to 9, the decimal is put between the first and second digits, and the exponent is accepted as a positive 0 through 4.

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